Midwest Engineer

SERVING THE ENGINEERING PROFESSION

WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

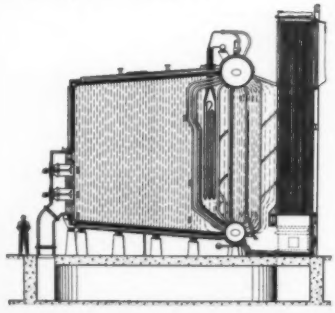
OVERSEAS EMPLOYMENT FOR ENGINEERS—PAGE THREE

Vol. 11 OCTOBER, 1958 No. 5

C-E Boilers exceed guarantees at ANHEUSER-BUSCH, Inc.

The Newark, N. J., brewery of Anheuser-Busch, Inc. The seven year old power plant, left, is so spectacularly clean and neat that it has constituted a major attraction for professional and technical groups along the eastern seaboard. The popularity of these tours is such that, currently, reservations must be made two months in advance.

(Above) One of the two C-E Type VU-50-B, oil-fired boilers in the Newark brewery (cross-section below). Each has a maximum continuous capacity of 100,000 lb per hr and produces steam at 550 psi and 750 F. The floor in the foreground is chemically cleaned daily, polished twice weekly and completely refinished yearly.



In a brewery, the demands placed upon its boilers can be rigorous indeed. At the Anheuser-Busch brewery in Newark, New Jersey, they provide steam for power generation, for processing and for numerous high-capacity instantaneous water heaters used in various brewing and bottling operations. Since brewing is essentially a "batch" process, steam demands fluctuate sharply and continuously. Yet the C-E Boilers installed at Newark have consistently exceeded performance guarantees and operate at an efficiency of 86%.

Mr. Herman Paradies, Superintendent of Utilities at the Newark brewery, has stated that it is not unusual for steam demands to rise from 80,000 to 130,000 pounds per hour in ten to fifteen seconds, and that the boilers have responded with nominal loss in pressure or temperature. This enviable record, which speaks well both for boiler design and for the skills of the power plant's operating management and staff, is one of which Combustion is proud.

When *you* need boilers, remember that C-E has a complete line of time-tested and service-proved designs and that there is a size and type which will fit your needs and serve you equally well.

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CONTENTS

COVER STORY

Our cover this issue shows the Main Laboratory Building of the Portland Cement Association. It was completed in 1950. Just to the left of the limits of the picture is the new Structural Laboratory, unveiled on September 8. The story and picture of the Structural Laboratory, literally a huge testing machine in itself, capable of exerting test forces greater than 10 million pounds, may be found on page 16.

Speaker and Paper Reading Group

To the many services now available to the members of the Western Society of Engineers, a new one has been added. It is a luncheon group at which papers are read and information about engineering problems exchanged. Only members of WSE are eligible to participate. This facility will provide a sounding board for a speaker to estimate the reaction of an audience to his paper which he is planning to deliver elsewhere. It will give an opportunity for junior engineers to gain confidence and it will afford a place for members to speak in engineering subjects close to their hearts.

This new group does not duplicate or compete with the Wednesday Luncheon meeting. Only members of WSE can read a paper or speak before this new group, whereas the speakers for the Wednesday Luncheons may or may not be members of the Society and they are invited because they have special information of wide spread interest.

To qualify to speak before the Paper Reading Luncheon Group, the member must attend the luncheons for a certain number of times and demonstrate his interest. To be eligible to serve as Chairman of the Day he must be in attendance a certain number of days in addition to the above. The program will be announced monthly by a postcard.

The first meeting was held Friday, November 7 at 12 noon. Meetings will adjourn at 1:15 P.M. sharp. The price of the luncheon is $1.50.

Young Engineers Forum

S. R. Price, Jr., chairman of the Young Engineers' Forum, has announced that the ninth Forum sponsored by the Western Society of Engineers begins on Monday, November 17. The Forum consists of five weekly dinner meetings as follows:

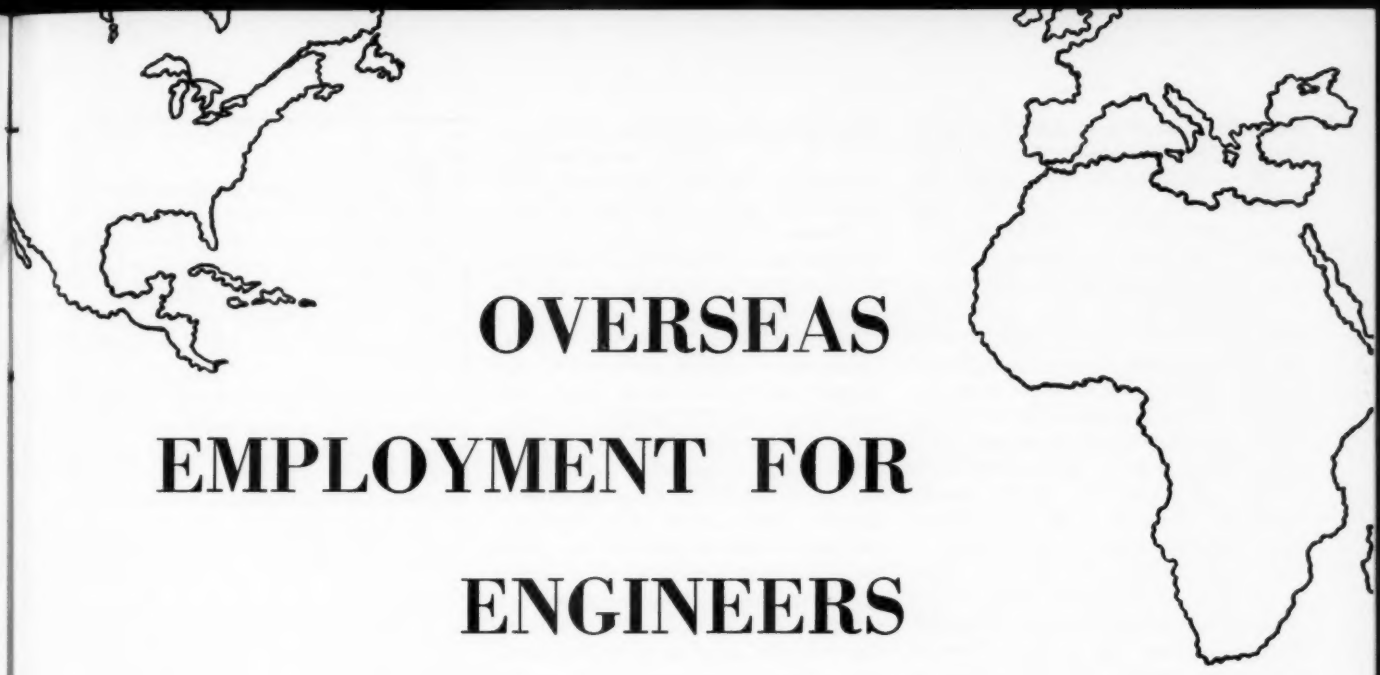
November 17—CONSTRUCTION
Ragnar and Raymond Benson,
Ragnar Benson, Inc.

November 24—ELECTRICAL INDUSTRY
Carroll V. Roseberry, Vice President,
Apparatus Div., Westinghouse Electric Corp.

December 1—MANUFACTURING
J. A. Handley, President,
Whiting Corporation

December 8—EDUCATION AND ADMINISTRATION
Dr. Frederick L. Hovde, President,
Purdue University

December 15—STEEL
E. C. Logelin, Vice President,
U. S. Steel Corp., Chicago



OVERSEAS EMPLOYMENT FOR ENGINEERS

By Donald A. Walsh, MWSE

Mr. Walsh is a structural engineer with the firm of John F. Meissner, Inc. This paper won a prize of $50 in the 1958 Prize Paper Competition sponsored by the Western Society of Engineers.

At one time or another, most engineers, either fresh out of college or with several years of professional experience have considered taking an overseas job. Their reasons are often quite different, but in general a higher salary with no U. S. income tax is the primary consideration. There are many other factors, however, which should influence the engineers decision on whether or not to accept a foreign job.

First of all he should never rely solely on travel folders and other information for tourists as a true representation of what actual living conditions are like in the foreign country. Such information, though generally correct, does not go into sufficient detail to enable one to get a clear picture of how the native population may live. Also embassies, consular offices and information offices tend to present only the better side of life in their respective countries. Americans enjoy the highest standard of living in the world and their standard of values is quite different from that of people in other countries. Things which Americans are accustomed to accepting as normal are often considered luxuries in foreign countries and they are paid for accordingly. To be told that the "cost of living" in a certain country is much lower than in the United States may be very true but the "standard of living" that this is based on is often completely unacceptable to Americans. As a result a good part of the money the engineer had planned on saving may have to be used for importing "necessities" from back home. For accurate and detailed information one should try to contact someone who has worked in the particular country, or who has recently spent considerable time there, before deciding on accepting or rejecting the job.

Do not sign a contract or work agreement for a foreign job without first studying it thoroughly and be sure to read all of the fine print. Consult a lawyer if possible as his fee for such service may be insignificant compared to the loss that may be suffered later on due to a mis-interpretation of the contract. Make certain what the working hours per week or month are and that provision for overtime is stated in the contract. Such things as type and class of transportation to and from the job should not be taken for granted. It could well be that the manner one returns from a foreign job may not be the same luxurious acommodations furnished for the trip to the job. The amount of personal possessions and luggage the employee takes with him should be largely governed by how he gets them home. Does the contract say that so many pounds of personal baggage will be paid for by the company TO AND FROM the job or is it only to the job? Trans-oceanic shipping rates often exceed the actual value of the article. The overseas employee is naturally bound by the conditions and terms actually stated in his contract and not what he had assumed was in it; therefore, it is to his advantage to seek legal advice before signing and not after.

Language Factor

Many things will determine how much an engineer enjoys his overseas job but the one which usually has the greatest bearing is the language factor. It has been particularly noticeable that the employees who dislike a foreign country most are generally the ones who do not speak the language. For this reason engineers who are planning to work in a certain area of the world should make every effort to study the language before they go abroad or at least to learn the language after they have arrived there. This seems to be a common failing of American overseas employees, part of which could probably be attributed to their not having been required to study languages while in college. Most European engineers speak three or four different languages fluently. This undoubtedly has some influence on the current overseas demand for European

engineers, compared to American engineers, especially in South America.

The question of the engineer and his family's health is one of the most important things to consider before definitely accepting a foreign job. Many men have been forced to break their contracts and return to the U. S., at their own expense, due to personal illness to themselves or some member of their immediate family. Not only is this expensive as far as paying his own fare home but it often means paying several thousand dollars in back income tax which much be paid regardless of the reasons for having to return to the U. S. There have been cases where men have had to leave their overseas jobs only a few days before they would qualify for U. S. income tax exemption and they must still pay the full tax. Most large overseas contractors usually do have limited medical facilities or access to military hospitals but for a serious illness it usually means giving up the job. Regardless of what the general public may have been led to believe, medical facilities in foreign countries are in no way comparable to those in the United States. The best thing is to make reasonably certain that ones health is good enough to complete the contract before deciding to take any overseas job.

Most overseas contractors prefer single men with no family attachments. This is generally due to a lack of adequate housing facilities on most foreign jobs. Often the contractor has to construct his own housing, so the fewer families he has to provide for the less expensive it is to him.

Wait Four Years

Young engineers directly out of college should not take a foreign job until they have had at least four years of professional experience. The reason for a time limit of four years is that every engineer's development depends to a large extent upon his personal and business contacts. After a tenure of duty overseas he must re-establish himself in his community and without these contacts this is often difficult. Also four years, in most states, is the required period of training for an engineering license. Any type of engineering license puts one in a much better bargaining position for a responsible overseas job. When a graduate, just out of college, goes on a foreign job at a relatively high salary he finds it extremely difficult to accept a lower salary upon returning to the U. S. As a result he accepts another overseas job and the cycle begins. This is not to be taken to mean that overseas jobs are not desirable but sooner or later the glamour has worn off and most men wish to return to a permanent job in a permanent location.

There are many incidental expenses connected with taking a job in a foreign country which are often overlooked. First of all there is usually a certain period of time before going overseas in which the engineer has terminated his employment with one employer and is not yet on the payroll of the new one. The same is true after he has completed the contract and must spend a certain amount of time looking for a new job and getting his personal affairs in order. There is also the cost of storing furniture and personal possessions, or of shipping them overseas. Some contractors pay for moving household goods; however, it is usually the exception instead of the rule. The cost of transporting an automobile overseas is quite expensive and it is usually cheaper to sell it or store it, rather than pay transoceanic shipping rates. One of the most expensive aspects of overseas jobs is the duplication of personal possessions. There are many items which must be purchased overseas and the employee may have the same articles in storage in the U. S. This pertains to clothing, furniture, automobiles, recreation equipment etc.

Perhaps the greatest pit-fall of overseas jobs is the danger of becoming what is known in the trades as a "construction stiff." This is a slow process by which a friendly drink at the local bar shortly becomes two or three and before long the trips to the local bar become more important than the job. This may sound like a slight exaggeration but for those who have worked overseas it is an acknowledged hazard. For this reason adequate recreation facilities are a "must" on overseas projects.

Advantages

There are many advantages to working in foreign countries. Usually the

Paper thermometers, printed on post cards, have been developed to tell whether goods have been exposed to excessive temperatures in shipment, reports "*Food Engineering.*" After a buyer receives his shipment, he sends the card back to the shipper. The color of the normally pearl-gray strips indicates the degree of heat the shipment was exposed to in transit.

amounts of paid vacation per year is greater than is customary in stateside offices and as a result one has an opportunity to do considerable traveling. The old slogan on the navy recruitment posters "join the navy and see the world" applies also to engineering, at least for those who seek it. Traveling in foreign countries can be very enjoyable as well as educational. One gets to see things, places and people that he would probably never have had the opportunity to see as an ordinary tourist. The most widely publicized advantage, of course, is the fact that you pay no U. S. income tax if you are employed in a foreign country for 510 days out of any 18 month period. There are certain exceptions to this, for example a government employee, but in general most overseas jobs give you this tax exemption benefit. For men with families, maids and servants are considered a necessity in foreign countries and for the woman of the house this is indeed a luxury.

From a professional standpoint it seems that the chances for advancement on overseas jobs are better. Also the degree of responsibility is often greater than one would have in a comparable U. S. office. In a stateside office a man may be handling work valued in thousands of dollars and in an overseas office he would be handling multi-million dollar projects, because small jobs are usually handled by local firms and outside consultants and contractors are not needed.

Keep Up With Developments

For engineers employed on foreign jobs it is very important that they keep up with the latest developments and projects in their particular profession. This is extremely important because most overseas jobs are not considered as being too secure. There is always the possibility of wars, revolutions, and politics within the country that may find the employee with a contract but without a job. Consequently, he may be back in the U. S. much sooner than expected and unless he has kept abreast of what is going on he may find it difficult to get another job.

At present there are numerous agencies and associations which hire only for overseas jobs. Some of them even maintain offices in foreign countries so that it is not necessary for the engineer to return to the U. S. to seek new employment.

There are still many opportunities for engineers to work in foreign countries. American engineers can be found almost anywhere in the world today, whether it be drilling for oil, building roads or developing the natural resources of a country. For those who like adventure, traveling and excitement overseas work can be a very rewarding experience.

Rapid Electrical Growth is Predicted

We are entering an era of unprecedented growth in the electrical and allied arts, L. F. Hickernell, of New York, new president of the American Institute of Electrical Engineers, told the Pacific General Meeting of the Society in Sacramento, California Aug. 19.

Hickernell, vice-president engineering, of the Anaconda Wire & Cable Company, said:

"Being no more clairvoyant than my predecessors, I am in no better position to foresee specific future developments in the electrical and allied arts. However, as a member of an industry which spends billions each year on research and development for military and civilian purposes, I am confident that we are entering an era of unprecedented growth."

Stating that "predictions of the future are a risky business," Hickernell cited examples where eminent leaders had made "errors in judgment" in predictions.

Discussing the Institute's future:

"Prediction of the future is a risky business, as indicated by two famous quotations:

1. In 1889, Thomas A. Edison said, "there is no plea which will justify the use of a high-tension and alternating current in either a scientific or commercial sense—my personal desire would be to prohibit entirely the use of alterating currents. They are as unnecessary as they are dangerous.

2. When plans were considered for using the Falls as a source of power, Sir William Thomson (Lord Kelvin), president, International Niagara Commission, cabled, "Trust you avoid gigantic mistake of adoption of alternating current."

"Fortunately, the many outstanding accomplishments of these pioneers far outweighed their error in judgment in choosing sides in the great battle of 'Ac vs Dc'."

Reviewing the growth of the Institute membership and service Hickernell announced that AIEE would "modestly observe" its 75th Anniversary in 1959 and was now formulating plans for the event. He said that the theme for the anniversary will be "75 Years—A Prologue to the Future."

Steel to Help in Smashing Atom

Unusually uniform electrical grade steel has helped make possible a new concept in smashing the atom, and will make possible the gathering of much more information on these basic building blocks of the universe. The new concept, called strong focusing, depends on huge magnets holding electrically charged atomic (protons) "bullets" on course, and using these particles to hit and break the nuclei of other atoms. The nuclear properties can then be observed and studied.

Now being built at Brookhaven National Laboratory on Long Island (N.Y.) is the world's largest and most powerful atomic machine—a mammoth new proton synchrotron. In somewhat less technical language, the Brookhaven people not only want to smash the nucleus of the atom, but they want to study the broken pieces and then see if they can put them back together, possibly in a different way and get different building blocks. They want to change matter into energy and then change energy into matter, and see what results they get.

What Brookhaven plans to do is pure research, and what may eventually develop from the facts gained is not at this time the concern of the scientists. However, dozens of industries might change their present day thinking, new industries might arise, medicine might come up with new and startling changes, old power sources might become obsolete. Chemistry, biology, space travel could all be shoved further and faster along by knowing some of the answers that Brookhaven hopes to learn.

To work with such minute bits of matter and energy, man has to build a huge machine. The synchrotron now being built, which will be ready for use in 1960, costs in the neighborhood of $25,000,000. Other machines have been built to smash the atom, but all except this proton synchrotron and a similar one being built at Geneva in Switzerland are using a different principle. The Russians have built a 10 billion-volt synchrotron of a somewhat different type, and began operating it about one year ago.

What Synchrotron Will Do

The Brookhaven synchrotron will accelerate protons until they have up to 25 or 30 billion volts of energy. The higher the energy of the particles, the faster they travel and the greater the possibility of "breaking" the nucleus and uncovering new facts about atomic structures.

The process of strong focusing is made possible with specially designed magnets that are alternately bowed out-and-in like large letter "C's." The magnetic force created by the magnets keeps the accelerating protons on course during the energy build-up period. The material for these large magnets was made by Allegheny Ludlum Steel Corporation, and was the largest single order ever produced by the company for this type of electrical steel. More than 3800 tons of electrical grade steel was used for the Brookhaven job, and delivered over a nine-month period.

Unusually exacting requirements and records were made on all "batches" of this steel. Stringent requirements in the fabrication of the huge seven-foot magnets, made by the Baldwin-Lima-Hamilton Corporation of Philadelphia, were also exacting. Each of the 240 magnets —commercial standards were rejected— had to be nearly identical in properties Magnetic properties in steel vary, not only from heat to heat, but also from sheet to sheet in the same heat and even from one section of a sheet to another part of the same sheet. All this was taken into account, and special devices and techniques were devised by Brookhaven personnel to compensate for any minor distortion of the magnetic field prior to installation of the big magnets. The magnet cores were fabricated by building up laminations of steel (0.031 inches thick) which were stamped on a 450-ton Hamilton press to proper pole configuration and outside dimensions of 33-inches by 39-inches. These cores, in two sizes, or thickness 75-inches and 90-inches, were strapped and welded under pressure to achieve an extremely high lamination factor—ratio of steel to air along core axis—of 98 per cent. The larger size magnets, 90-inches thick, weigh 15½ tons each.

How Does the Synchrotron Work?

The heart of the synchrotron is the combination of 240 magnets arranged in a circle more than a half mile in circumference, inside which is placed a vacuum chamber seven inches in diameter and 3⅜ inches high. The giant magnets will develop enormous magnetic force of 10,000 to 13,000 gauss, and will be buried in a giant subterranean cement tunnel, 17-feet 9-inches high and 18-feet wide. The tunnel will me covered with twelve feet of earth.

The vacuum chamber, which is located in the jaws of the "C" of the magnets, will contain a clear aperture 2⅜ inches high and six inches wide. It is through

this narrow aperture that a beam of protons will be made to travel as they are accelerated to tremendous energies.

Before the protons go into the synchrotron, their energy is first raised in a high-voltage generator to 750,000 electron volts. From here, they go into a linear accelerator and by stages are raised to an energy of 50,000,000 electron volts, and at this stage they are injected into the half-mile track to whirl round-and-round. Each time they go around the track, twelve radio-frequency accelerating stations give them additional boosts in energy so that at the end of their travels — one second in which they have gone around the half-mile track some 350,000 times—they are traveling with an energy of 25-to-30 billion electron volts, and at velocity approaching the speed of light.

At precisely this moment the proton hits the nucleus of an atom and "breaks" it so that protons and neutrons are released. In addition, a variety of mesons will also be created. The meson is a mysterious particle, and is believed to be a special cosmic cement that holds the parts of the atom together.

Once this is done, Brookhaven scientists hope to be able to observe through various ways what happens and what are the forces which really hold the nucleus together.

What happens at Brookhaven in 1960 may mean the beginning of a great new world of tomorrow.

Personnel Carrier

The last word in a small personnel carrier is a midget jeep that turns into its own carrier for air transport and parachute drops, reports *Product Engineering*. Unfolded, the jeep carries four passengers, goes 60 miles per hour. The folded container can be carried easily by the four-man crew and unfolded for use in one minute. The design uses aircraft materials and production techniques to keep the weight down to 700 pounds.

Auto Supermarkets

Shopping centers may take on a new look with the addition of auto supermarkets for retail sale of cars reports *Fleet Owner*. It's not a pipe dream, as there has been much speculation in Detroit on such a project. The super-automarket would handle the big three, along with foreign and independent makes. It would be an enterprising project for any dealer. Only one prerequisite is needed: plenty of money.

Mining Engineers Elect J. W. Woomer

The Society of Mining Engineers, a constituent body of the American Institute of Mining, Metallurgical, and Petroleum Engineers has announced the succession of Jerome W. Woomer, Pittsburgh consultant, to the post of president of the society for one year beginning February, 1959. His succession and the election of other officers and directors of the Society was reported formally at a meeting of the Society's Board of Directors in Salt Lake City Sept. 16.

Mr. Woomer's term follows that of Stanley D. Michaelson, of Salt Lake City, currently President of SME.

Arthur B. Cummins, of Manville, N. J., manager, Central Chemical and Physical Research Department, Johns-Manville Research Center, has been named president-elect of SME, to succeed to the presidency in 1960, following Woomer's term.

Donald W. Scott, of Hibbing, Minn., general manager, Continental Sales & Equipment Co., will take office in 1959 as SME vice-president for the Central Regional Area. Representing the Coal Division of SME, James C. Gray of Pittsburgh, will become a member of the society's Board of Directors for three years beginning next February. He is administrative vice-president, raw materials, U. S. Steel Corp. Other new SME Directors, at the same time, will be John G. Broughton, representing the Industrial Minerals Division; William B. Stephenson, representing the Minerals Beneficiation Division, and Ewald Kipp and Sherwin F. Kelly, representing the Mining & Exploration Division.

Broughton is State Geologist for New York. Stephenson is president of the Allen-Sherman-Hoff Pump Co., Wynnewood, Pa. Kipp is mining engineer, special representative, The Eimco Corp., Salt Lake City. Kelly is president of Sherwin F. Kelly Geophysical Services, Inc., Amawalk, N. Y.

Stainless Steel Used for Retubing

The struggle to reduce the cost of electricity to the homeowner is a continuing battle of the utility companies and their suppliers. In what is believed to be the first undertaking of its kind, a complete main steam condenser was retubed with all stainless steel tubes. These stainless steel tubes have a life expectancy of 30 years compared to up to 10 years for the tubes previously used. In addition, the new stainless steel tubes are expected to give better performance than the tubes formerly used.

Monongahela Power Company's Rivesville Station in West Virginia has just installed, in their Unit 6 condenser, 9,234 stainless steel tubes supplied by Allegheny Ludlum Steel Corporation. These tubes are 26 feet long and 7/8-inch outside diameter, giving a condensing surface area of 55,000 square feet.

The condenser reduces the exhaust steam from the low-pressure turbine to water, which is returned to the boiler where it is again reheated to high-pressure steam to run the turbine that drives an 85,000 kva generator. About 45,000 gallons of Monongahela River water is pumped through the condenser per minute to absorb heat from the steam at 80 to 115 degrees F. and condense it to water.

The pH value of Monongahela River water at Rivesville has been known to be as low as 2.8. The pH value is a number between 0 and 14 which denotes the degree of acidity or alkalinity. The pH scale resembles a thermometer or hydrometer scale; it indicates the intensity of acidity or alkalinity. A solution having a pH value of 7.0 is neutral, being neither acid nor alkaline. Numbers below 7.0 denote acidity and those above denote alkalinity. pH values of 6.0, 5.0, 4.0 and 3.0 indicate, respectively, 10 times, 100 times and 10,000 times as much acid as a 7.0 pH value.

Many problems arise when cooling water is corrosive to condenser tubes. Among them is the film of corrosion products which adheres tenaciously to their surfaces and tends to retard heat transfer from the steam to the cooling water. If this corrosion film is not removed when the tubes are cleaned, their cleanliness condition will not be restored to much better than 60 per cent cleanliness factor. However, if the corrosion film is removed at each cleaning, the bare tube metal is exposed to more rapid attack from acid river water.

Some stainless steel tubes (Type 304) installed only under the air baffle of another condenser were found to be free of any corrosion film and apparently are not subject to corrosion attack from Monongahela River water. Thin wall stainless steel tubes that are 85 per cent clean have about the same heat transfer ability as the thick-wall nonferrous tubes previously used.

The possibilities for better average condenser performance with less cleaning maintenance together with the greater life expectancy prompted Monongahela Power Company engineers to try a complete installation of stainless steel condenser tubes. It is believed that the average performance level of the unit will be improved and on cleaning, when it is required, sufficient recovery will be obtained to pay for the cost of cleaning.

By helping to reduce the cost of running the electric generating equipment, the stainless steel tubes will, in the long run, assist in further reducing electrical costs. In 1940, a kilowatt-hour used in the home cost 4¾ cents. In 1954, that same kilowatt-hour cost the consumer less than 3½ cents, and last year the cost was 3.09 cents per kilowatt-hour. It is expected that a further reduction is on the way to less than three cents per kilowatt-hour.

ASHAE Exposition Slated for January

The 65th Annual Meeting of the American Society of Heating and Air-Conditioning Engineers and the 14th International Heating and Air-Conditioning Exposition under the auspices of ASHAE will be held in Philadelphia, Pa., January 26-29, 1959. ASHAE registration headquarters will be at the Bellevue-Stratford Hotel. The Exposition will be held in Convention Hall. Prior to the opening of the 65th Annual Meeting and the Exposition on Monday, January 26 the Council and various committees will hold meetings on Saturday and Sunday, January 24 and 25, 1959.

The Annual Meeting will consist of seven Sessions including three Symposiums and one Topical Session. The Topical Session will consist of papers concerned with Human Comfort as related to indoor environment. One of the Symposiums will be on the general subject of Hydronics, the other one on Heat-Pump Performance and the third Symposium will be on Corrosion and Water Treatment. The various papers planned for the 65th Annual Meeting have been selected for their timely interest.

Reactor Levels to be Raised

The operating power levels of two pioneer nuclear reactors at the Argonne National Laboratory will be increased in connection with new structural changes, it was announced in Lemont, Ill.

Engineering, design and construction modifications will be performed on Argonne's Experimental Boiling Water Reactor (EBWR) and Chicago Pile 5 (CP-5), a heavy water research reactor.

The announcement was made by John H. McKinley, Argonne business manager.

McKinley announced that:

1. The architect-engineering firm of Sargent & Lundy, Chicago, has been awarded a contract to plan the conversion of EBWR to a 100,000 kilowatt plant. EBWR is presently operating at the design level of 20,000 kilowatts. Construction will amount to approximately $1,500,000.

2. The architect-engineering firm of Shaw, Metz & Dolio, Chicago, has been awarded a contract for modifications on the Chicago Pile 5 reactor. Construction will amount to approximately $500,000. The operating power level of CP-5 will be raised from 2,000 kilowatts to 10,000 kilowatts as part of the plans.

The U. S. Atomic Energy Commission allocated the $2,000,000 to Argonne for the two projects.

McKinley commented:

"We anticipate that these modifications will greatly increase the usefulness of EBWR and CP-5 as important research tools in Argonne's program."

The Sargent & Lundy EBWR plan has three main components:

1. Installation of new heat exchange equipment within the reactor shell to absorb 80,000 kilowatts of heat. (The turbine-generator will continue to take 20,000 kilowatts of heat to generate 5,000 kilowatts of electricity. This would comprise the 100,000 kilowatt total output.)

2. Construction of heat removal equipment, to be housed in a new building adjacent to the EBWR shell. This equipment will include an evaporator, secondary drain cooler and accessories.

3. Construction of a new cooling tower behind the reactor, to dissipate unwanted heat.

The plans call also for construction of new steam lines, pipes and pumping units. Completion is scheduled for the end of 1959.

The 80,000 kilowatts of new heat generated by EBWR would be piped as desired into the Laboratory's system, for heating buildings. Power generation would remain at the present 5,000 kilowatt level.

Argonne scientists and engineers are designing a new and larger core, to convert EBWR to 100,000 kilowatts. This core is to contain a greater number of enriched fuel elements in a 5 ft. x 5 ft. area, instead of the present 4 x 4 area.

Main components of the CP-5 project include:

1. Construction of a new concrete building adjacent to the reactor shell. The structure will contain a canal for storage of spent fuel elements, and "hot" caves for handling of highly radioactive materials behind heavy shielding.

2. Installation of new heat exchange equipment within the reactor shell.

3. Construction of a new cooling tower, and modifications on the present cooling tower.

New fuel elements will be inserted into the CP-5 core as a prelude to operation at 10,000 kilowatts.

The increase in CP-5's operating power level means that greater populations of neutrons will be made available to Argonne scientists for experimental purposes. One advantage of the higher level will be that samples of materials can be irradiated in less time than at the present.

Completion of the project is expected in June, 1959.

Chicago Pile 5 is a large-scale enriched uranium heavy water reactor. Its sole purpose is to provide abundant radiation—primarily neutrons—for research.

CP-5 is a direct descendant of CP-1, the world's first nuclear reactor. CP-1 was built by the late Dr. Enrico Fermi and associates at the University of Chicago. It was used to achieve history's first controlled nuclear chain reaction on December 2, 1942, under the West Stands of Stagg Field at the University of Chicago.

The Experimental Boiling Water Reactor is a direct cycle boiling reactor. It was originally designed for 20,000 kilowatts of heat and 5,000 kilowatts of electricity. The electricity supplies most of Argonne's daily power needs.

Synthetic Soles

Some 400 million pairs of shoes—68 per cent of the total footwear output—will have synthetic soles this year, states *Chemical Week*. Shoe output has risen only 13 per cent since 1950, but the use of synthetic soles has climbed 37 per cent since 1950.

Research Center Opened in Skokie

International Minerals & Chemical Corporation formally opened its $5 million Administrative and Research Center in suburban Skokie early in September with a series of open houses for a total of more than 3,000 guests from the Chicago area.

Families and friends of employees, community leaders from Skokie and the North Shore suburban area, and Chicago civic and business dignitaries visited the Center during the three events.

There are 600 employees at the new headquarters center of International, which is a leader in the mining, refining, and processing of non-metallic ores and chemical derivatives, with 68 mines and plants and a product list that totals 60 items.

The Center comprises five buildings just completed and a Research Center built on the 21-acre site in 1951.

Designed by Perkins & Will, Chicago architectural firm, the center is the newest addition to the expanding greater Chicago skyline and is described as a new and unique concept in business environment.

Adjoining Harms Woods Forest Preserve on the West, the multiunit Center fronts on a central plaza with a patio and reflecting pool, and is landscaped to create a campus atmosphere.

The Center has its own heliport, located atop its Administration Building, which puts the city's major airports only minutes away. The central five-story Administration unit is the first office building in the country with its own heliport incorporated in the original design.

The new structures, in addition to the Administration Building, include a three-story building housing the staff and operating divisions, a one-story electronic center, a one-story employees' lounge, and a one-story cafeteria building. Turner Construction Company was the general contractor.

Louis Ware, IMC board chairman, described the buildings as a "symbol of IMC's first half century of progress and an appropriate setting for future corporate growth." The Company started in 1909, producing phosphate and mixed fertilizer, and has grown from $5 million in annual sales than to more than $100 million now, with 90 percent of that gain coming since the Corporation moved its headquarters to Chicago from New York in 1941.

The Corporation's growth and increasing need for more space and more efficient quarters prompted the decision to construct its own headquarters, and the planning for this center dates back 15 years, Ware said.

"These facilities, specifically designed to fit the administrative and product-division structure of the IMC organization, will provide space for estimated growth through 1965 with sufficient ground area for further expansion as needed."

Incorporate Every Advantage

The buildings themselves incorporate every advantage of modern office construction, with maximum efficiency of arrangement providing 89 percent usable space in the building's office floors. The Center has a total gross square footage of 187,046.

The average distance from a desk to the tinted, glare-reducing window walls of the buildings is only 25 feet, and desks are equally close to the service core (elevators, washrooms, and stairways) of each building.

The Center has its own 450-car parking lot, with special lots for guests and top executives.

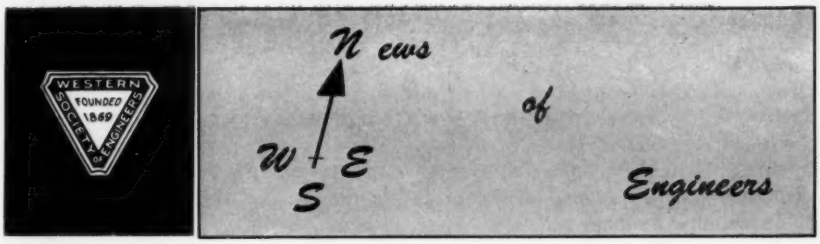
Ground was broken for the new buildings in December, 1956, and employees moved into the center late in June of this year. Finishing touches of the construction were completed September 1.

Ceramic Coatings Strengthen Metals

Recent research breakthroughs which show that metals and alloys can be made to withstand extremely high temperatures through use of ceramic coatings are now moving out of the lab stage and into production, according to Frederick Stroke, manager of nuclear and rocketry projects for the Bettinger Corporation, Waltham, Massachusetts. Stroke predicted on Aug. 6 that within five years, 90 per cent of all metals used in high temperature applications will be given greater strength and resistance through coatings of specially formulated ceramics which will protect against heat, corrosion, erosion, and other stresses and strains.

Stroke said that Bettinger's new plant, now being constructed in Milford, Massachusetts, will be able to process metal parts in the very high temperature ranges, on a production basis. Metals coated with ceramics and bonded at over 2600 degrees F. at the new plant will be able to withstand much higher temperatures in actual use. Firings at the new plant will be made in both normal and controlled atmospheres.

Stroke pointed out that increasing efficiency of both rocket engines and nuclear reactors is putting almost impossible demands on metals, including the newer metal alloys. Only special ceramic coatings or other types of protective coatings make it possible for the metals to withstand even higher temperatures and perform properly in the newer rockets and reactors. Stroke said that development work has already begun on a metal-ceramic combination that can operate in the range of over 5000 degrees F.



William E. Schweitzer, MWSE, was recently elected President of the Rotary Club of Evanston, Illinois. Mr. Schweitzer, who is President of William E. Schweitzer & Company, General Contractors, has been a member of Western Society since 1945.

* * *

Dr. Albert V. Crewe has been appointed director of the Particle Accelerator Division of the Argonne National Laboratory, Dr. Roger H. Hildebrand, associate laboratory director for high energy physics, has announced in Lemont, Ill.

Dr. Crewe has been Technical Director of the synchrocyclotron at the University of Chicago and an assistant professor on the university's faculty in the Department of Physics and Enrico Fermi Institute for Nuclear Studies.

* * *

Recently appointed to the Board of Directors of the Alumni Association of the Illinois Institute of Technology were two members of Western Society of Engineers. Maurus T. Goetz, president of Teletype Corporation will represent the College of Engineering and Chester W. Hauth, secretary-treasurer of the Viking Automatic Sprinkler Company will be chairman of Awards.

* * *

Five appointments to the faculty of Illinois Institute of Technology, Chicago, have been announced, effective Sept. 1.

They are: Jack C. Brown, instructor in technical drawing; Dr. Audrey L. Companion, instructor in chemistry; Dr. Fausto Ramirez, associate professor in chemistry; Robert R. Rogers, instructor in business and economics, and Lutrelle P. Wassman, lecturer at the Institute of Design.

Brown has been a graduate assistant at IIT and also has taught at the University of Alabama. He was consultant and foreman for the C. J. Brown Contracting Co. Tuscaloosa, Ala., and was with the U. S. Corps of Engineers for two years.

He received his bachelor's degree in civil engineering from the University of Alabama. Brown has done graduate work there and at Illinois Tech, where he currently is working toward a master's degree in engineering graphics. Brown, his wife, and two children live at 3101 S. Wabash Ave.

Miss Companion, formerly a research chemist at Carnegie Institute of Technology, also was a chemist at the Gulf Research Center, Harmerville, Pa.

She received her bachelor's, master's, and Ph.D. degrees from Carnegie Tech. A specialist in theoretical physical chemistry, she was recipient of the Carnegie, Alumni, Mellow, and Kaufmann scholarships, the Eastman Kodak Fellowship, and was a Founder's Scholar at Carnegie Tech.

Ramirez received his bachelor's, master's, and Ph.D. degrees in chemistry from the University of Michigan, where he was a Paul Bagley Scholar and a Rackham Fellow.

He comes to IIT from Columbia University, where he was an assistant professor. He also was a post-doctoral fellow at the University of Virginia.

Ramirez has been consultant for the Standard Oil Co. of Indiana and the American Cyanide Co. Author of many original research articles and book reviews, he has done research for the Office of Ordnance Research in the field of organic chemistry. He and his wife have two children.

Rogers formerly was an administrative assistant at Armour Research Foundation of Illinois Institute of Technology. A graduate in chemistry from Berea College, he received his master's degree in business and engineering administration from IIT.

He was a training aids officer in the Navy from 1951 to 1955 and also has been a chemist for the Chicago and Northwestern Railroad. He is a native of Oak Park, Ill.

Wassman has designed the Ecko line of kitchen tools for Latham-Tyler-Jensen and the National Packaging Show exhibit for the Container Corporation of America. In addition, he has designed products for Raymond Loewy Associates, the Hotpoint Co., and the University of Illinois Press. At present he has his own design firm.

He is a graduate of the University of Illinois, where he received the freshman art award and the senior industrial design award.

* * *

The appointment of Dr. Louis A. Turner as deputy director of the Argonne National Laboratory has been announced in Lemont, Ill. by Dr. Norman Hilberry, Laboratory director.

Dr. Turner has been director of the Physics Division at Argonne since 1950.

In his new assignment, Dr. Turner will fill a position which has been vacant since Dr. Hilberry, formerly deputy director, became director at Argonne in 1957.

"The promotion of Dr. Turner to the deputy directorship at Argonne will bring to the administration of Argonne the teaching and research background of one of this nation's most widely-respected senior physicists," said Dr. Hilberry.

Dr. Turner, who graduated from Cornell University in 1920 and received his doctor's degree from Princeton University in 1923, was first to suggest the possibility of producing and using plutonium as a nuclear fuel and, in effect, foreshadowed the breeding principle in his theory. During World War II he was one of the nuclear physicists at Massachusetts Institute of Technology who developed radar for military use.

Dr. Turner became interested in uranium fission at an early date and submitted articles on the topic to *Physical Review* and *Reviews of Modern Physics*. In 1940, more than two years prior to creation of the Manhattan District, he pointed out in a *Physical Review* article that uranium^{239} would probably decay to form element 94^{239}, which is now known as plutonium. He further pointed out that this element's nucleus would be one in which the production of fission by slow neutrons would be

highly probable. In an article submitted for publication in May, 1940, but withheld from publication until 1946 by a voluntary system of censorship then in effect, he advanced the idea that the predicted fission properties of element 94^{239} offered a basis for an indirect method of securing energy from uranium^{238}.

After completing his doctorate work under K. T. Compton at Princeton, Dr. Turner did research work in spectroscopy at Harvard University for one year as a fellow of the National Research Council. He then returned to Princeton where he engaged in research and teaching activities until 1940 when he took leave of absence for war-time work.

During the war Dr. Turner served as a special consultant to the Secretary of War on the military use of radar beacons and identification devices; as a consultant to the combined British-American research group at the Navy Research Laboratory. At the end of the war he became chairman of the important OSRD Vacuum Tube Development Committee. He remained at MIT until June, 1946, and became technical editor-in-general in charge of four volumes of the Radiation Laboratory SERIES and has been a co-editor of the volume *Radar Scanners and Radomes* and the author of various chapters in several volumes of the series. He was awarded the Presidential Certificate of Merit for his war-time services.

Dr. Turner became head of the department of physics and professor of physics at the State University of Iowa in 1946, but maintained contact with atomic energy work as a member of the board of governors of the Argonne National Laboratory.

As a fellow of the Guggenheim Memorial Foundation, he worked with Professor James French at Zweites Physikalisches Institut der Universitaet in Goettingen, Germany, during the year of 1929-30. In 1937-38 he traveled to Copenhagen, Denmark, to work as a guest in Niels Bohr's Universitetets Institut for Teoretisik Fysik, and collaborated there with Dr. O. A. Frisch.

He was one of the authors of "Spectroscopic Notation" *(Physical Review,* June, 1929) which brought order out of the chaotic situation which existed in spectroscopic nomenclature.

Huge Belt System Being Erected

A contract for the longest permanent cross-country transport belt conveying system ever constructed, 5½ miles in length, was awarded by Ideal Cement Company of Denver, Colorado, to Link-Belt Company, it was announced Sept. 2.

This unique "rubber railroad," using 36-inch wide belts, will transport crushed limestone and shale, the raw materials for cement, at a rate of 1,000 tons per hour, from Ideal's Lawrence, Okla. quarry to its Ada, Okla. cement mill. Construction of the all-weather conveyor has begun and completion is scheduled for early 1959.

The entire multi-million dollar system comprises seven conveyors arranged consecutively to provide continuous flow of material. The length of the longest individual conveyor will be 11,920 feet, the longest in the world today, according to Link-Belt. This conveyor will require a single rubber belt more than 4½ miles long.

The belt conveyor is a part of Ideal's $22 million expansion program at its Ada plant which will have a capacity of more than 3 million barrels of cement annually. The Ada, Okla. expansion is a part of Ideal's $170 million company-wide expansion program which is designed to increase Ideal's productive capacity to 40 million barrels annually by 1965. Ideal Cement Company is the largest independent cement producer operating solely within the United States and has 15 plants in 12 states from the Gulf of Mexico to the Pacific Northwest.

For this reason, it is appropriate that one of the most unusual features of the cross-country belt conveyor will be the use of prestressed light weight concrete channels, which both support the conveyor and provide a continuous all-weather cover throughout its entire 5½ mile length. Prestressed concrete is one of the cement industry's latest developments and this is the first time it will be used for supporting a cross-country belt conveyor. The prestressed concrete channels and precast concrete piers will be furnished by the Thomas Concrete Pipe Company of Ada, Okla. Conveyor drives and terminal machinery will be supported on steel structures and corrugated aluminum guards will provide protection from winds.

The conveyor system will conform to the topography of the rolling terrain of the Oklahoma countryside over its five and a half mile length. The belt conveyor will be about four feet above the ground except when it passes over three public highways, two railroads, and several crossings located at intervals along the system to provide passage for livestock, farm machinery and light vehicles. The conveyor will be paralleled by an access road, and the right of way will be enclosed the entire length by a fence.

New Fabric?

Fibers from mulberry, oleander, and cotton stalks are being woven into cloth in Red China, reports *Product Engineering.* The Chinese claim their new processes produce fabrics "as good as cotton" in sheen, resistance to acid and dyeability. However, they say the new wood-derived fibers do not quite come up to cotton in tensile strength.

Reviews of Technical Books

Steel Structure Design

Design of Steel Structures, by Edwin H. Gaylord, Jr. and Charles N. Gaylord, McGraw-Hill Book Company, New York 36, N.Y. 1957. Pages, 530. Price, $8.00.

This book is intended for beginners in structural design with main attention given to steel bridges and building frames and their connections. In addition, some attention is given to aluminum because of its increasing importance as a structural metal.

The authors have related both examples and problems to practical situations. Although this approach results in occasional review of topics in elementary strength of materials, the advantages gained justify the repetition.

There are new treatments of bending about both axes, and lateral buckling characteristic of beam subjected to such bending. A chapter on the application of theories of ultimate strength gives the student an introduction to this theory. Ample examples and problems are given throughout. Adequate reference to the available literature helps both the student and practicing engineer.

A feature of the book that should appeal to both the student and practicing engineer is the presentation and discussion of design calculations for several structures that have actually been built. These include a plate girder railroad bridge, truss spans and approach slabs of a highway bridge, and the wind bracing for the Lever House in New York City.

City Transportation

Better Transportation for Your City, by the National Committee on Urban Transportation, available from the Public Administration Service, 1313 East 60th street, Chicago 37, Illinois. Pages, 96. Price, $5.00.

Better Transportation for Your City was prepared as a guide to help cities do a better job of transportation planning through systematic collection and analysis of basic facts. Many of the nation's foremost transportation authorities contributed to the contents of the book. The program presented in the book has been endorsed by the Joint Committee of the American Municipal Association, the American Association of State Highway Officials, the American Transit Association, the Bureau of Public Roads, the U. S. Department of Commerce, and numerous other national bodies.

The book discusses the establishment of a transportation planning program for a city. Stage 1 describes the processes involved in organizing for the job. Stage 2, Getting the Transportation Facts, describes the studies and surveys required to gather necessary data about street use, origin destination, land use, existing traffic service, existing transit service, the physical street system, and financial records. Stage 3, Defining the Problem, explains methods for analyzing transportation data, making projections, adopting standards, and determining deficiencies. Stage 4, Developing the Transportation Plan and Financial Program, deals with comparisons of alternate transportation problem solutions, evaluating the proposals, and developing the financial program. Stage 5, adopting the Preferred Plan and Financial Program, reviews public information, aspects and necessary legislative action. Stage 6, Carrying Out the Plan, discusses establishment of transportation priorities and coordination of the work program. Two final chapters discuss "Improving Transportation Administration" and "Modernizing Laws and Ordinances."

Better Transportation for Your City is a valuable guide for anyone interested in the traffic and transit problems of cities.

Construction Estimates

Construction Estimates and Costs, by H. E. Pulver, McGraw-Hill Book Company, New York 36, N.Y. Pages, 653. Price, $8.00.

Construction Estimates and Costs is an estimator's manual containing estimating data and methods for every type of construction. Two hundred and eighty-seven illustrations and tables describe simple but accurate estimating procedures. One hundred and thirteen elements of construction work are covered. Every step is included—from preliminary investigation to final detailed estimates.

Many examples of typical jobs are illustrated. Professor Pulver has developed the book for the purpose of aiding contractors and engineers in making accurate estimates.

Examples of subjects covered are Handling and transporting materials, Excavation, Masonry, Wood construction, Structural Steel, Roofing, Heating, Electrical work, Painting, Equipment, Concrete, and many more.

In addition the book contains chapters on overhead and profit, complete estimates, approximate estimates, and construction management.

Building Construction

Building Construction Handbook, by Frederick S. Merritt, editor in chief. McGraw-Hill Book Company, New York 36, N.Y. Pages, 851. Price, $15.00.

This volume was written by 25 authorities on building practices. It deals with all phases of every building project and was prepared for use by the supplier of building materials, the engineer, the architect, the contractor, and the owner. Each topic is developed in detail and written in easily understandable terms for the specialist and the non-specialist. The book draws directly on actual experiences of the authors.

The handbook contains 183 tables, 428 illustrations, and 29 chapters. It includes complete chapters on materials, stresses in structures, foundations, concrete construction, steel construction, wood construction, windows, walls and partitions, doors, floor coverings, roof coverings, building hardware, heating and air conditioning, insulation, plumbing, waste disposal, and lighting. In addition, it presents useful information on professional services and business structures, surveying, estimating, construction management, specifications, and insurance.

Better Fuel Elements Sought

How to produce better and more stable fuel elements for nuclear reactors is being investigated by scientists at the Argonne National Laboratory, Lemont, Ill. These scientists are studying fuels under burnup of as much as 5.2 percent of the fissionable atoms; they seek to learn what the best kinds of fuel are for power-producing reactors.

J. Howard Kittel of the Argonne Metallurgy Division reported new investigations of fuels in a technical paper he presented Sept. 9 at the Second International Conference on the Peaceful Uses of Atomic Energy at Geneva, Switzerland. Co-author of the paper, "Effects of Irradiation on Solid Fuel Materials," is S. Hugh Paine, also of the Argonne Metallurgy Division.

Kittel and Paine state:

"One of the most serious technical problems which must be solved in order to obtain economic nuclear power is the development of fuel materials which can sustain fission of a large fraction of the total atoms in the fuel without serious damage to its desirable engineering properties. In particular, dimensional stability of fuel elements must be maintained during extended reactor exposure."

To minimize costs of atomic power it is necessary to keep nuclear fuel (uranium or plutonium and their compounds) in a reactor as long as possible before reprocessing and to run the reactor at the highest possible temperature.

Kittel and Paine found that although unalloyed uranium with suitable metallurgical treatment can be subjected to burnups of 2 percent of its atoms without reprocessing, there is severe damage to this fuel. (Deleterious changes which occur at moderate irradiation temperatures are principally because of surface roughening and growth such as lengthening.)

While no one kind and composition of fuel has been reported as the best for all nuclear reactors, Kittel and Paine explored the characteristics under irradiation of many of the more promising fuel materials to even higher reactor exposures than those used for unalloyed uranium. These fuels have such alloying additions as chromium, molybdenum, niobium, silicon, and zirconium.

Studying the characteristics of fuels for fast breeder reactors (reactors that produce more fissionable fuel than they consume), the scientists investigated the properties of an alloy of residential fission products referred to collectively as "fissium."

A pyrometallurgical (refining by heating) process has been developed at Argonne for reprocessing fast reactor fuel elements. In this process a group of fission products which cannot be removed will tend to build up to an equilibrium amount with several successive recycles of the fuel. The ratio of these elements among themselves is expected to remain fairly constant, but the level to which they accumulate in the reactor fuel can be controlled by varying the amount of burnup and the efficiency of reprocessing.

Kittel and Paine in their paper report that alloys of uranium-fissium-molybdenum, uranium-plutonium-fissium, and uranium-plutonium-molybdenum show promise as fast reactor fuels.

Because most metallic fuels are unstable in physical size and shape, and because fuel in some reactors must resist water corrosion, scientists are now intensively studying what happens to ceramic fuels under irradiation. (Ceramic fuels are oxides formed under heat and pressure into small pellets resembling pottery.)

In their paper Kittel and Paine discussed the ceramic fuels which have received the most study, uranium oxide and mixtures of thorium oxide and uranium oxide.

The authors conclude:

Thorium and thorium-uranium alloys show dimensional stabilities which are superior to those shown by metallic uranium fuels. Oxide fuels are characterized by even better stability under irradiation.

Weapon Systems Group is Formed

A new advanced weapon systems (AWS) group has been formed by Philco Corporation's Government and Industrial Division, it was announced in Philadelphia.

In making the announcement, S. C. Spielman, director of engineering for the division, said that Hayden N. Ringer had been promoted to manager of the new group.

Spielman explained that the objective of the AWS group will be to study and formulate new and advanced weapon systems to meet future military requirements.

A native of Gloucester, Mass., Ringer went to Philco in 1945 from Massachusetts Institute of Technolgy and has been engaged in television research and missile fuze development programs.

Prior to his promotion, he was in charge of the G and I Division's missile fuze research, development and production engineering for the Terrier, Talos, Tartar, Sergeant, Corporal, Little John and Falcon missiles.

Ringer received his bachelor's degree in mechanical engineering from Tufts University and a bachelor's and master's electrical engineering degree from MIT.

A resident of Palmyra, N. J., he is a member of the Institute of Radio Engineers, American Rocket Society, Operations Research Society of American Ordnance Association.

TV to Help in Teaching Physics

In a revolutionary attempt to raise the standards of physics teaching in all sections of the United States, a nation-wide college course in Atomic Age Physics will be televised over the National Broadcasting Company network for two semesters, beginning October 6 and continuing through June 5. Designed primarily for high school science teachers, the program will be known as the "Continental Classroom."

The course, to be offered for credit through the auspices of local colleges and universities, will be telecast from 6:30 to 7 a.m. (in each time zone) Monday through Friday. This marks the first time in the history of mass communications that a course for college credit has been offered on a nation-wide basis.

The national teacher will be Dr. Harvey E. White, professor and vice-chairman of the department of physics at the University of California in Berkeley. Other internationally known scientists will serve as guest lecturers. Dr. White, a physics teacher for more than 30 years, has written five college texts. One of these, *Modern College Physics*, is the most widely used book in its field in the United States. In addition to his teaching, Dr. White has served as an International Research Fellow in Berlin and has directed research for the National Defense Research Committee, the Office of Scientific Research and Development, and the Manhattan Project.

Sponsors of the course include The American Association of Colleges for Teacher Education, the Fund for the Advancement of Education and N.B.C. Consultants for the series include Dr. Mark Zemansky, chairman of the department of physics at City College of New York; Dr. Henry Semat, professor of physics at CCNY, and Dr. Vernet E. Eaton, professor of physics at Wesleyan University, Middletown, Conn.

Lessons during the first semester will be devoted to those aspects of physics necessary for an understanding of nuclear physics: kinematics, light, dynamics, electricity, magnetism. In the second semester, emphasis will be on nuclear and atomic physics. Not only will demonstrations and experiments be an integral part of the course, but TV presentations will be supplemented by periodic tests, textbook assignments and out-of-class activities.

Under the direction of Dr. Edwin P. Adkins, national coordinator, local college and university personnel will implement the program on their own campuses. Participating colleges and universities may utilize the network program at no cost and may charge regular tuition fees for those registering for credit. The AACTE recommends that a minimum of three hours of credit be given each semester; however, the amount of credit a college or university offers will be determined locally.

Both educators and scientists have expressed enthusiasm for the project. "Today is a time in history when the improvement of science education is vital," according to Dr. Harvey M. Rice, president of the AACTE. "It is also a time when classrooms and teachers are in short supply. By utilizing television—a medium that has proved its educational worth—the practical problems involved in the process of up-dating science teachers are by-passed."

It is anticipated that in addition to teachers-in-service, the course will appeal to a large number of college students, gifted high school pupils, engineers, and others who wish to increase their knowledge of nuclear physics.

Remote Controls

Remote controls for manufacturing processes are just a matter of time in view of advances already made in the handling of atomic materials, reports *Electronics*. There is now a remotely-controlled device that cuts out a piece of corroded, radioactive piping, replaces it with fresh piping, welds it into place, televises the welding operation so that it may be inspected while it goes on, and tests it by ultrasonic waves.

Ground Breaking

CHAIN Belt Company, Milwaukee, announced the recent ground breaking for its new plant to be constructed at Madison, Ind. The company had announced a short time previously the awarding of a contract to Dunlop & Company, Inc. of Columbus, Ind. to construct the Madison plant.

The new plant will be a modern concrete and steel structure located on Highway 421, North of Madison. Plans call for a main plant with 115,000 square feet of floor space, and a 20,000 square-foot sheet metal warehouse. Construction is scheduled for completion toward the end of this year. Manufacturing operations are expected to start early in 1959.

When completed, the new Madison plant will manufacture CHAIN Belt's Rex line of concrete road paving and finishing machinery. It will help consolidate the company's present operations at plants in Niles and Newton Falls, Ohio, and Rock Island, Ill.

In addition to these three plants, CHAIN Belt has manufacturing facilities in Los Angeles, Calif., Dolton and Downers Grove, Ill., Springfield and Worcester, Mass., Toronto, Ontario, Canada. The company is a leading manufacturer of sprocket chains and power transmission machinery; bulk material handling equipment; sewage, water and industrial waste treatment equipment; self-aligning roller bearings; and construction machinery.

Largest Testing Machine Shown

The "world's largest testing machine" was publicly shown for the first time on Sept. 8 at the Research and Development Laboratories of the Portland Cement Association, near Chicago.

The "machine" is actually the three-story high Structural Laboratory shown below in the picture, constructed above ground entirely of precast concrete building units which were tilted or lifted into place by giant rigs and cranes. The massive floor of the building is designed like an exceptionally strong bridge, and is pierced by a total of 690 holes. By using relatively simple apparatus in combination with the floor, technicians at the new laboratory are able to conduct many tests that cannot be carried out anywhere else in the world.

The building, part of a $3 million expansion of the Association's research and development facilities at Skokie, Ill., is expected to produce information having a far-reaching effect on design and construction of many types of concrete structures. It adds 22,400 sq. ft. to the 103,400 sq. ft. of research facilities already at the site. A second new laboratory, a Fire Research Center, will be placed in operation early in 1959 to provide an additional 35,400 sq. ft. of test space.

Floor Two Feet Thick

The Structural Laboratory is unique primarily because of its testing floor. The top surface of the floor is 24 in. thick, and is joined to an 18-in. thick basement floor by a series of 8½ ft. high walls. In cross section, it resembles a large hollow box-girder bridge. Actually, the floor is built much stronger than an ordinary bridge because it acts as a test frame for all the forces applied to specimens in the Laboratory.

The top surface of the floor is pierced by holes every three feet along its 120-ft. length and 56-ft. width. To make most tests, steel rods are attached to the test beam or girder, and extended downward through the holes to connect with hydraulic jacks located in the basement. These jacks pull down on the rods, exerting enormous loads on the test structures above.

The Laboratory earns its title as "the world's largest testing machine" not only because of its size, but because of the tremendous test loads it can handle. The floor can withstand test pressures produced by the hydraulic jacks of more than 10 million pounds. By comparison, one of the largest conventional testing machines, recently installed, can produce a load of 5 million pounds. In addition, the Structural Laboratory can apply its loads easily at any point, and in any direction, on specimens of practically any size or shape.

Many Kinds of Tests Possible

In the building, a floor slab or roof shell can be subjected to local loads of as high as 30,000 lb. per sq. ft. A slab the size of the entire testing floor could be subjected to a load of many thousands of lb. per sq. ft. A 50-ft. long beam can be given a total load of some 2 million pounds—forces considerably in excess of those that actual structures are required to withstand.

In fact, according to Dr. A. Allan Bates, MWSE, the Association's vice-president for research and development, the floor is designed to handle every test for which the staff could imagine a future need, plus a little more.

The new laboratory is already at work testing various types of structures and building units. A project is now underway to develop additional engineering information about newer types of concrete shell roofs. This type of roof, which can span great distances with a shell of concrete only a few inches thick, has become increasingly popular for large buildings such as stadiums, aircraft hangars and exhibition halls.

Another project is aimed at development of better methods of connecting precast concrete units, such as factory-produced beams, wall panels, columns and girders. Prestressed concrete, a very rapidly growing type of concrete construction, will also be studied, to extend its applications still further.

Building Interesting in Other Ways

Although the testing floor is the most unusual portion of the new laboratory, the rest of the building shows off some advanced practices in the structural and architectural use of concrete.

The entire laboratory above the first floor was assembled from precast units, erected by power equipment. These units were designed by a new method of engineering analysis called "ultimate strength design," which is beginning to supersede the method currently used by most structural engineers. The "ultimate strength" method takes into account more exactly than older methods the inherent strengths of concrete and reinforcing steel, and makes possible the construction of longer spans and higher buildings out of reinforced concrete.

The walls of the building were cast in forms lined with rubber mats. After the concrete had hardened, the mats were stripped away, leaving the wall

The Portland Cement Association's new Structural Laboratory is called "the world's largest testing machine." Except for floor and foundations, the entire building was assembled from precast concrete units. It contains facilities for structural testing unmatched anywhere in the world.

surfaces with an attractive, textured surface.

The steel used for reinforcement was specially rolled from alloy steel having about twice the strength of ordinary reinforcing. The concrete is also stronger than that of most structures.

The entire building is air-conditioned to a constant temperature and humidity to prevent atmospheric changes that might affect test results. Three stories of offices and shops are located at one end of the building, and the basement is utilized for additional shops and storage. Test specimens are usually cast right in the laboratory.

Second Laboratory Completed

The Structural Laboratory is under the direction of Dr. Eivind Hognestad, Manager of the Association's Structural Development Section, and is under the overall supervision of Douglas McHenry, Director of Development.

A second building recently erected at the Laboratories, the Fire Research Center, has been completed but is not operational. It will be equipped next spring with several huge furnaces for testing the fire resistance of full-size concrete beams, slabs and structural members. It will be the only laboratory in the United States equipped for this specific type of work. Other fire testing laboratories, such as Underwriters Laboratories in Chicago, are devoted to establishing fire resistance ratings. The Portland Cement Association laboratory will be used primarily for research aimed at improving the fire resistance of concrete and concrete building elements.

The Portland Cement Association is a national organization to improve and extend the uses of concrete. It has its headquarters in Chicago, and offices in 32 major cities of the United States and in British Columbia, Canada. Its Research and Development Laboratories are the largest in the world devoted to research on cement and concrete.

Dream Auto

An automobile that is both literally and figuratively a "dream car" has been built by a California inventor, *Electrical Wholesaling* says. The completely electronic car stops, steers and follows all safety standards while the driver sleeps, and it does not need a cable built into the road to guide it.

Computers Perfect Transformer Design

Electronic computers are effecting "a change in transformer design philosophy," a paper prepared for the Fall General Meeting of the American Institute of Electrical Engineers said.

Reporting on this change, H. J. Weber and George Gallousis of the Allis-Chalmers Manufacturing Co., Pittsburgh, Pa., said in the paper for a transformer session that the computer is capable of insuring "a mathematically perfect and consistent line of standard transformers."

In a step in this direction, they said, their firm has underway a program in which the computer supplies the design engineer with the best possible initial design for the transformer after it (the computer) receives a description of the transformer in a mathematical form incorporating every variable influencing the cost of the design. In order to make the design practical and ready for production, the engineer then replaces the continuous variables with the nearest standard sizes. The final result is a practical optimum design, the cost of which is only slightly above that of the theoretically optimum design.

"At some time in the future," the two men emphasized, "the computer program will be generalized so that the machine will choose standard sizes to provide the optimum design automatically."

Additional advantages of computer use, they said, are that sales engineers can be quickly supplied with quotation information, and that theoretical studies can be made concerning the influences on design and cost varying losses, impedances, audio noise levels, materials and prices.

In explaining the undertaking of the computer program at Allis-Chalmers, Weber and Gallousis said that the development of a new philosophy of transformer design is a logical extension of the use of computers to determine optimum design.

"By use of the computer to vary specific parameters while others are held constant," they said, "it is possible to determine with exactness the interrelation of the parameters. The data thus obtained when evaluated and correlated with actual test of field experience can be used as a basis to either modify or refine presently accepted design formula or concepts or to establish new approaches to the designer problems—in short, to effect a change in transformer design philosophy."

Current to Flow Beneath Channel

Electricity will begin to flow under the English Channel between France and England in time to meet the winter peak of 1960-61, it was revealed in a paper prepared for Oct. 27 at the Fall General Meeting of the American Institute of Electrical Engineers.

The project, long under study so that the power grids of the two nations can be connected, is now in the engineering stage, Francois M. Cahen and Roger A. Tellier, of Electricite de France, said in a paper describing the work, as well as the high voltage transmission of electricity from the Alps to the Paris area. Their paper, prepared to be presented at a research symposium, was titled, "Two Examples of Industrial Research in France Relating to the Transmission of Electrical Energy."

"The commissioning of the direct current interconnection is planned for the end of 1960 to secure the benefits of its advantages during the 1960-1961 winter peak," they said. "The power finally adopted taking the possibilities of mercury vapour valves into account is 160MW under 200 KV, the middle point of the transmission being earthed."

The cables will be laid between Dugness on the English Coast and Le Portel on the French Coast, a distance of some 32 miles and will connect the British 275KV and the French 225 KV systems, so that power can be exchanged.

In describing the high voltage lines from the Alps to Paris, the two French engineers told how existing 225KV transmission lines had been converted to 380KV.

Record Sales

This year, the nation's record buyers will boost sales to an all-time high of some 300 million discs, reports *Chemical Week*. More than 98 per cent of these will be nonbreakable. Eight years ago nonbreakable discs took only a 15 per cent slice of the market.

New Products

As described by their Manufacturers

Gate Valves

Gate valves for the handling of liquid oxygen and other cryogenics are now available from Koehler Aircraft Products Company, Dayton, Ohio. They can be utilized as pre-valves or fill valves under operating conditions involving line pressures up to 60 psi and ambient temperatures ranging from —320°F to +250°F.

Valve actuation can be accomplished manually, electrically, hydraulically or by pneumatic pressure.

These gate valves can also be used for the handling of standard aircraft and missile fuels and oxidizers.

For further information write *Midwest Engineer*, Key 1001.

Polyethylene Faucet

The development of a new high temperature, high density, polyethylene faucet, designed for use in polyethylene tanks and other vessels, has been announced by the American Agile Corp., Maple Hts. (Cleveland), Ohio.

The new faucet is ¾″ in size and has been adapted as a practical solution to draining corrosive liquids from various containers.

A prototype is expected to be in production soon. This drain faucet is to be made of branch and linear polyethylene and polypropolene.

For further information, write *Midwest Engineer*, Key 1002.

Mobile Power Plant

A mobile power plant capable of producing enough electricity to serve a community of 1,500 people has been constructed by the Illinois Central Railroad. The power unit was designed by Robert I. Fort, electrical engineer of equipment, to meet the electrical needs of parked sleeping cars used as hotels by passengers at such events as the Kentucky Derby and Mardi Gras.

Air conditioning and other electrical equipment have resulted in increased power requirements for parked passenger equipment. To supply these needs it has generally been the practice to have local power companies install expensive temporary transformer banks to supply power to cars. The mobile power unit will eliminate such installations.

The power supply unit consists of two converters installed in a conventional baggage car with necessary control and distribution panels. The mobile unit takes its power from a diesel electric locomotive and converts this direct current to 220-volt alternating current which is then used to service parked passenger equipment. Receptacles on the side of the mobile unit provide outlets for 24 power cables. The unit was constructed in the Illinois Central's Paducah, Ky., shops.

During its first use at the 1958 Kentucky Derby the unit provided power for air-conditioning, lights and ventilation on 28 parked sleeping cars.

When not required for use on the Illinois Central the mobile unit may be rented by other railroads or used in disaster or emergency service where a power failure occurs.

Shock Control Pad

A new Type "S" Unisorb Vibration and Shock Control Pad has been developed by the Felters Company for use in protecting packaged equipment during shipping. It is particularly suited for safeguarding electronic equipment, business machines, computors and large precision and electrical apparatus, either crated or uncrated, in order to avoid damage and repair and adjustments at the destination.

A special feature is said to be that Type "S" Unisorb can either be used with a special Unisorb Cement which eliminates necessity for bolting or lagging to shipping cases or it can be used in conjunction with conventional bolting, or a combination of the two. Unisorb and Unisorb Cement will withstand shear forces of 75 to 100 lbs. per sq. in. It is thus possible to cut crating and shipping time, as well as reduce costs on materials, in addition to providing efficient vibration and shock control.

For shipping, crating and packaging applications, Unisorb Type "S" is available in handy roll or sheet form and can be cut to particular shapes and patterns quickly and easily right on the job. Unisorb Cement has unusually tenacious holding power and is available in gallon containers.

Sample and specifications of Unisorb and Unisorb Cement are available. Write *Midwest Engineer*, Key 1003.

Dip Tube

State and municipal acceptance of the glass-reinforced dip tube developed by the A. O. Smith Corporation, Milwaukee, signals an end to a domestic water heater problem of collapsing non-metallic dip tubes.

Recent tests conducted by authorities who previously had banned the use of non-metallic dip tubes in state and municipal areas has gained acceptance for the tube in Chicago, Milwaukee, Cincinnati, Cedar Rapids, and the state of Wisconsin.

Approved by the National Sanitation Foundation, the glass-reinforced dip tube is certified to be non-toxic and to contribute no foreign odor or taste to water. It is certified by Iowa State University as an Independent Testing Laboratory to remain rigid — unchanged in shape and form — under all boiling water conditions.

The water heater industry long has had a dip tube problem. Some non-metallic thermoplastic tubes tended to soften and collapse at temperatures of 170-180 degrees F. Metallic dip tubes shortened the life of anodically protected units by causing electrolytic corrosion.

When the metallic and thermoplastic dip tube problems were brought to the attention of A. O. Smith, they immediately put their research people to work to solve the problem. The end result was the A. O. Smith glass-reinforced dip tube.

The glass-reinforced dip tube is of *thermoset* construction and will withstand temperatures up to 350 degrees F. The thermoset construction of the dip tube eliminates the problem of electrolysis and makes the tube impervious to live steam and temperatures much hotter than ever encountered in domestic water heaters.

On June 6, 1957, Chicago became the first major municipality to formally approve the tube through their plumbing testing laboratory. The city now

differentiates between dip tubes of *thermoset* construction—considered safe—and the still outlawed *thermoplastic* tube that is subject to softening under 212 degrees F. heat.

J. H. Brinker, vice-president of Smith's Permaglas Division, Kankakee, Ill., says more than a million of the glass-reinforced tubes are in service throughout the United States. In addition to the cities noted, Brinker says that tests are being conducted on the dip tubes in other major municipalities across the nation.

The acceptance of this new dip tube is another "first" by A. O. Smith in meeting and maintaining the high standards set by the National Sanitation Foundation.

Rock Bucket

Schield BANTAM Company of Waverly, Iowa, has announced the availability of a new heavy-duty rock bucket for its goose-neck backhoe attachment. The new 25" bucket features heavy-duty construction throughout. Side bits are 1" thick and the bottom bit 1½" thick. The new bucket, weighing 275 pounds, is ideal for digging in extra tough ground conditions and rocks. The new rock bucket is adaptable to BANTAM's goose-neck backhoe design on either the carrier-mounted, crawler-mounted, or self-propelled cranes-excavators.

For more complete specifications and prices on the new bucket, contact any authorized Schield BANTAM Distributor or write *Midwest Engineer*, Key 1004.

Electro-mechanical Recorder

A leading producer of aluminum believes it has an answer to accurate measurement of levels inside large tanks containing super-saturated solutions of sodium aluminate. Sodium aluminate is the basic raw material that is desolved out of bauxite clay in the manufacture of aluminum.

Major problem is measuring the level of this solution or other similarly saturated solutions, is its tendency to precipitate continuously on any measuring device inserted into the liquid. Level indicating devices employing mechanical or displacement means for measuring become clogged and ineffective.

R. T. Hipps, instrument engineer for the Hurricane Creek plant of Reynolds Metals Company, Bauxite, Arkansas, installed an electro-mechanical recorder to measure the level inside a surge tank containing a concentrated solution of sodium aluminate kept near the boiling point. Mr. Hipps, working with representatives of Robertshaw-Fulton Controls Company, which developed the instrument, decided that this sensitive electronic equipment would solve the difficult measuring problem.

In addition to the instrument, the installation included a 14-foot-long flexible probe inserted vertically into the tank through a one-inch threaded connection. The probe is made of ½-inch steel cable sheathed in durable plastic. Once set into position, the probe measured a 10-foot range of liquid with no further adjustment necessary.

Calibration of the measuring system was accomplished with independent adjustments for zero and span, thereby eliminating the necessity of emptying the surge tanks.

The installation has been in operation for more than a year, and is subjected to frequent inspection. Despite its location completely exposed to the elements, the system has operated without maintenance needs and has met the manufacturer's requirements for high-level accuracy.

Scale deposits on the sensing electrode do not affect the accuracy of the Robertshaw-Fulton system. On inspection, it was found a 1/16-inch scale had built up on the probe. Despite this, the instrument continued to show remarkable response to level changes. In fact, even the smallest ripples made in the continuously agitated liquid are recorded on the circular charts.

A Robertshaw-Fulton spokesman says the instrument, called a Series 42 Recorder, is of the self-balancing, capacitance type. It can be used as an indicator, recorder-controller, or for transmitting electric and pneumatic signals. The Series 42 Recorder is manufactured by the Bridgeport Thermostat Division, Robertshaw-Fulton Controls Company, Milford, Connecticut.

Plyophen 5900

A new plastic especially designed for use in missiles and rockets has been announced in White Plains, N. Y. by Reichhold Chemicals, Inc. Laminated parts made from it will withstand up to 4500°F for brief periods, and up to 500°F for 100 hours and longer.

The new phenolic resin, designated Plyophen 5900 by RCI, is said to produce laminates having not only exceptionally high strengths at elevated temperatures, but also low moisture absorption, good insulation properties, and good resistance to organic solvents, weak inorganic acids, hydraulic aircraft oil, de-icing fluids, and hot gas erosion.

Earlier plastics of this type had been proven better than most metals at withstanding high temperatures for short periods of time, but they had not been recommended for continuous service at temperatures above 300°F, says RCI.

Reinforced with glass cloth or asbestos, the resin will be used for nose-cone sections, skin strengtheners, internal hoops, electronic equipment mountings, and other missile and rocket parts.

The new plastic is suitable for either low-pressure or high-pressure lamination. According to Reichhold, laminates produced by either method more than meet the usual requirements and specifications for such materials. In fact, the firm claims, low-pressure laminates

made with Plyophen 5900 exhibit better properties than those obtained at high pressures with some earlier resins of this type.

Typical test results are: Ultimate strength flexural, flatwise, psi 85,900, compared with the usual specification of 50,000. Ultimate compressive strength edgewise, psi 60,240, compared with the specification of 35,000. Ultimate strength flexural, flatwise, psi, at 500°F, after 100 hours' exposure to 500°F 67,320, compared with the specification of 12,500.

Inquiries concerning Plyophen 5900 may be addressed to *Midwest Engineer*, Key 1005.

Literature

Metal Lath

Technical Bulletin No's. 12-1 and 12-2 relating to "Suspended Metal Lath and Plaster Ceilings" are now available for free distribution from the Metal Lath Manufacturers Association, Engineers Building, Cleveland 14, Ohio.

A feature of these two bulletins is a large illustration covering the size and spacing of all metal components for a metal lath suspended ceiling. This illustration covers: the minimum size of hangers; the maximum spacing of wire hangers along each main runner; the size and weights of cold-rolled main runner channels; the maximum spacing of runners and maximum spans of furring; the maximum spacing of cross furring; types of cross furring; and the types and weights of metal lath.

Other topics covered by T.B.'s 12-1 and 12-2 include: maximum limitations of main runners for spans up to 7 feet, and cross furring; properties of cold-rolled channels; a table on hangers which denotes the minimum requirements for maximum areas; and recommendations for compression members to resist the upward movement of ceilings for areas that are subject to high-velocity winds.

These two worthwhile supplements also feature the ventilation of concealed ceiling areas; channel ties and splices; and channel clearances.

Dock Leveling Devices

A new catalog sheet, illustrating and describing its new line of mechanically counterbalanced, truck-actuated dock leveling devices has just been published by Rowe Methods, Inc., Cleveland.

The free literature lists three models, all of which have capacities of 20,000 lbs.

In operation, the deck is raised in a standby position for an incoming truck. When the truck's body contacts the truck lever arms on the front of the dock, the force transmitted through twin actuator shafts displaces the counterweight and lowers the deck onto the truck bed.

The deck follows the bed during freight transfer and when the truck leaves, the potential energy of the displaced counterweight returns the deck to the up position.

Complete specification of all models are highlighted in the catalog sheet. A photograph of the dock leveling device is also included.

Copies may be obtained from Rowe Methods, Inc., 2534 Detroit Avenue, Cleveland 13, Ohio.

Heating Equipment

A new bulletin announced by The Trane Company, believed to be the first of its kind, includes specialized application information for engineers on the firm's lines of heating equipment for high temperature, high pressure, hot water systems.

Trane is a leading manufacturer of air conditioning, heating, ventilating and special heat exchanger equipment.

Products covered in the unique bulleting are Trane Model HS Horizontal Unit Heaters, Model PS Projection Heaters and Torrivent Coils.

Also included are complete capacity tables and charts, conversion factors for all size units, methods of calculating capacities over a wide range of conditions, coil selection data and recommended engineering specifications.

HTHW systems are especially suited to large, high heat load applications where heat must be moved over broad distances to widely separated locations from a central heating plant.

For further information, write on your firm's letterhead to Trane, La Crosse, Wisconsin, for Bulletin D-327-2.

Steel Making

Green River Steel Corp.'s exclusive process for making steels of unusual density and fine grain structure is described in a new four-page brochure.

Steels produced by this exclusive Macro-Clean Process are ideally suited for the production of any machine part that is subject to stress during operation. The illustrated brochure pictures several applications and shows how the Macro-Clean Process yields sounder alloy, stainless, carbon and specialty steels. Write Green River Steel Corp., Owensboro, Ky.

Stainless Steel Tubing

Engineers, purchasing agents and others responsible for the procurement of stainless steel tubing for heat exchangers and condensers will benefit by the information contained in a new folder released by the Tubular Products division of The Babcock & Wilcox Company. Known as Bulletin 415, the publication explains how welded stainless steel heat exchanger and condenser tubes are made, and also points out the fabrication and service advantages of using fully annealed tubing. Copies of TB-415 are available without charge from B&W's Tubular Products division sales office at Beaver Falls, Pa.

Aluminum Plant Starts Operating

The first independent aluminum reduction plant in the United States is in operation. Harvey Aluminum, long-time fabricator of aluminum mill products, is now starting regular production at its aluminum reduction facility at The Dalles, Oregon. The Company was scheduled to deliver its first commercial output around October 15, shipping primary metal in a wide range of specifications to meet any standard or special requirement. Capacity of the new smelter is more than 100,000,000 pounds of aluminum yearly.

"Our entry into the primary picture, to round out our activities, culminates a ten year program of blood, sweat, and tears," said Lawrence A. Harvey, executive vice president. "The achievement of complete integration and status as a major aluminum producer compliments everyone in our organization and demonstrates a cardinal principle of America . . . that a man can go as far as his talents and initiative can carry him."

Located in a scenic setting on the Columbia River 88 miles east of Portland, the facility uses large quantities of Bonneville hydroelectric power generated at The Dalles Dam to produce pig, ingot, and billet. The dam is five miles away.

Designed by Harvey Aluminum engineers, the reduction works incorporates the latest and most efficient equipment and operating techniques. Automatic systems throughout the plant control processes on a quantitative-qualitative statistical basis. The electrolytic cells in which the aluminum is made were designed, engineered, and built by Harvey Aluminum in its Torrance, California plant. The reduction facilities contain two potlines, consisting of 240 pots housed in four separate buildings.

No newcomer to the aluminum industry, Harvey Aluminum has assumed a significant position in the field of fabrication and is acknowledged as the largest independent producer of wrought aluminum mill products such as extrusions, press forgings, impact extrusions, rod and bar, pipe, tube, hollow sections, forging stock, hand forgings, electrical bus bar, structurals, and special shapes.

Sales of primary aluminum are conducted from the company's general offices in Torrance, Calif., and through factory branches across the country.

In addition to aluminum, Harvey is a major titanium producer (titanium is a new lightweight metal of the air age, half the weight of steel and more resistant to corrosion than stainless and with the high strength of tool steels); the largest zirconium smelter in the nation (zirconium is a metal of the atomic age with special neutron and elevated temperature properties that make it possible to build the heart of the modern atomic reactor); and a prime supplier of both metals in billet and mill product forms for the metalworking industry. The company also fabricates mill products in steel, magnesium, brass, and rare metals.

Pioneer "Old Faithful" Takes First Vacation

"Old Faithful," a steelmaking pioneer, has taken its first vacation in 52 years. After rejuvenation, its back at the old stand making steel again, it was reported in Chicago.

"Old Faithful" is an electric motor—the first electric motor to drive a rolling mill. It was first installed in the 30-inch universal plate mill at U. S. Steel's South Works in 1906.

Representatives of the manufacturer —Westinghouse Electric Co.—have just finished a two-week task of rewinding the motor. The record of "Old Faithful" has been recognized in both the steel industry and the electrical motor manufacturing industry.

In that span of 52 years, that motor supplied power for the rolling mill which turned out 6,250,000 tons of steel—the type used in building railroad locomotives, big shovels, boilers, cover plates, railroad cars and bridges.

If this 6,250,000 tons had been made all into railroad gondola cars, (which are mostly steel) they would make a train stretching from Chicago to Miami, Fla.

Or if this steel were all made into bridges, similar to the Mackinac Bridge, it would extend from Chicago to Pittsburgh.

Symposium Studies Noise Abatement

How to control noise in jet airliners was among major problems which were considered at the 9th annual National Noise Abatement Symposium held in Chicago on Oct. 9 and 10.

The meeting, held at the Hotel Sherman, was sponsored by Armour Research Foundation of Illinois Institute of Technology in conjunction with a number of professional associations.

Other major topics scheduled for discussion included control of industrial noise, and the reduction or elimination of noise in manufactured consumer products and appliances.

Some twelve papers were presented by specialists in noise control and reduction during the two-day meeting.

Co-sponsors with Armour Research Foundation were the Acoustical Society of America, American Society of Safety Engineers, National Noise Abatement Council, American Society of Planning Officials, American Industrial Hygiene Association, Acoustical Materials Association, and *Noise Control Magazine.*

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Dome is Largest Round Building

The world's largest circular building —Union Tank Car Company's Union Dome nearing completion at Baton Rouge, La. will also be one of the most strikingly colorful buildings in the country.

The exterior surface of the huge dome will be painted bright yellow and will appear to have a bluish haze because of the royal blue paint on its external supporting members.

The Union Dome is 384 feet in diameter and approximately 10 stories high (120 feet). The Dome consists of 321 hexagonal steel panels welded together and strengthened by external supporting tension and compression members. The total exterior panel surface area to be painted is 154,900 square feet.

The Union Dome is the first major industrial use of a geodesic dome and will serve as a regional tank car repair and maintenance plant for Union Tank.

The unusual coloring will give an appearance of lightness to the huge dome, according to George Hunt, industrial designer for the Union Dome.

The exterior surface of a 200 foot long connecting tunnel will be painted yellow with its external supporting members a bright red. The tunnel will house facilities for painting tank cars.

Twelve different colors will be utilized for painting the exterior, interior and equipment of the Dome and its facilities.

The interior skin of the Dome will be painted an off-white. The various pieces of equipment will be painted in contrasting colors to aid identification and for safety.

According to industrial safety codes, a high-visibility yellow will be used for all moving equipment, including cranes, with the exception of the 30-ton gantry crane which will be high-visibility yellow with light green for vertical structural members. All LPG lines as well as all important valves throughout the plant are to be painted alert orange. All fire equipment, extinguishers, etc., will be fire protection red. All electrical lines, conduits, and switchboxes, will be safety green. Light blue-green will be used for hot water tanks, hot water lines, and steam lines; a darker blue-green for cold water lines and maroon for cold water standpipes and pipe truss and utility stations.

The center office structure, a smaller geodesic dome within the Union Dome, will be trimmed in royal blue.

The total of 6,000 gallons of paint needed for the project is all being supplied by Socony Paint Products Company of Metuchen, N. J., through its Beaumont, Texas, office.

The Union Dome and its facilities were expected to be in full operation sometime in October.

Union Tank Car Company is the leading supplier of tank cars serving the petroleum industry and also leases cars to rail shippers of chemicals, coal tar products, vegetable oils, liquid fertilizers and numerous other liquid products. Of special significance is the company's new "Hot Dog" car in which the dome and underframe of conventional tank cars are eliminated.

Army Engineers Test Tellurometer

A lightweight electronic distance measuring device designed to eliminate the laborious and time-consuming taping method used in surveying is under test by the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va.

Called the Tellurometer, the device consists of a master and a remote or "slave" station set up at opposite ends of the line to be measured.

Tests have indicated that using the instrument, measurements up to 40 miles can be made in one-tenth the time, and with fewer personnel than required by the conventional taping method. Two men can operate the Tellurometer, and measurements can be completed in 10 to 30 minutes depending upon the accuracy required. The equipment is operable under a variety of terrain and weather conditions.

Equipment for each station weighs approximately 90 pounds and can be backpacked by two men. In operation the master station transmits a microwave signal which is received and transmitted back to it by the remote station. On receipt of the retransmitted signal, the master station measures the travel time of the radio waves. The measurement is read and controlled by the master operator. The remote operator merely performs switching and tuning operations at the command of the master. A built-in duplex radio telephone circuit permits the operators to communicate.

The Tellurometer is simple to operate. Only two days are required to train a master station operator, and even less time for the operator of the remote station.

The device was developed by the Telecommunications Research Laboratory of the South African Council for Scientific and Industrial Research.

World Industry Receives a Boost

Anglo-American collaboration in the service of world industry received a significant boost Sept. 9 with the signing of a new manufacturing agreement between Armstrong Siddeley Motors Ltd. and Clark Bros. Co. Division of Dresser A.G. it was announced in New York. Terms of agreement provide for licensed manufacture in the United Kingdom of gas turbines designed and made by Clark in the U.S.A.

Armstrong Siddeley Motors has long been prominent in the field of automotive and jet engine manufacture. Clark Bros. Co., Olean, N. Y., one of the Dresser Industries, is a leading American maker of gas turbines and heavy compressors used by many industries.

Initial activity of the new team will include the production of an undisclosed number of giant turbine units for major oil and gas producers throughout the world. It will be followed by other long-range production of gas turbines for the oil, gas, chemical and process industries in the major world markets.

Clark Model "302" and "305" gas turbines — modern successors to the original John Barber gas turbine patented in England in 1791—represent the last word in technological development and application engineering in this highly specialized field of equipment, according to Mr. R. R. McCartney. They are widely used as drivers for Clark centrifugal compressors, as well as in mining, marine and process industry applications. They are also used in designs for nuclear and atomic energy power plants.

Nearly 27 percent of U.S. drivers involved in 1957 traffic fatalities were under 25 years of age.

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Chicago Gets New Blooming Mill

United States Steel Corporation has underway the construction of a new blooming and structural mill at its South Works in Chicago, Charles J. Hunter, general superintendent, has announced. The ultramodern mills will produce standard structural and wide flange beams of the lighter weights, which are in great demand by the construction industry.

The new facilities will consist of a blooming mill for primary rolling operations with new soaking pits, reheating furnaces, a secondary or breakdown mill, and a cross country 4-stand structural mill. This mill unit will replace two obsolete blooming mills and two obsolete structural mills.

The capacity of the structural mill will be considerably greater than the old mill complement. In addition, the installation should increase the output of the present 52-inch wide flange beam mill by relieving it of the production of lighter weight sections which, when rolled on this mill, have the effect of decreasing its overall production.

The new mill unit will have many features which are unique and which will contribute to its versatility. For instance, it will be possible to replace mill stands to permit rapid changing from structural shapes and semi-finished products to wide flange beam sections.

Four single stands will be used for rolling standard structural shapes and semi-finished products. When wide flange beams are rolled, the single stands will be replaced by three 2-stand and one single stand Universal units. The 2-stand units include both horizontal and edge rolling components.

Operation of the mill will be controlled by an electronic card-reading and control system with no moving parts. This system will perform automatically such operations as the positioning of all mill screws; the adjustment of all main motor speed settings; the positioning of side guards; manipulators and fingers; and the re-entry of the piece being rolled in all reversing stands.

The blooming mill for the plant is being built by United Engineering & Foundry with controls by Westinghouse Electric Corp. Programmed functions include screwdown opening, entry speeds and acceleration rates. The bloom will be automatically turned and manipulated.

Structurals stands are being built by Blaw-Knox with controls by General Electric. Twenty-three functions are being programmed. Separate cards will control individual stands but programs will be tied together in complementary fashion.

U. S. Steel is working toward a highly organized flow of steel from bloomer through finishing stands. Linear programming techniques are being used to come up with best mill utilization.

Steel for both the blooming and structural mill buildings was rolled at South Works. American Bridge Division of U. S. Steel designed, fabricated and is erecting the steelwork.

"World" of Concrete Subject of Institute

European and American engineering developments in concrete presented a stimulating and well-rounded picture of recent advances and probable future trends at the 11th Regional Meeting of the American Concrete Institute Oct. 27-29, 1958. The three-day program at the Statler Hilton Hotel featured technical sessions on concrete design, construction, and materials with a special session devoted to dedication ceremonies for the new ACI international headquarters building in Detroit.

Precast concrete building construction in Russia was discussed by James D. Piper, Portland Cement Association, Chicago, and Walter H. Price, U. S. Bureau of Reclamation, Denver. Mr. Piper and Mr. Price were members of a 6-man delegation invited to inspect concrete construction in Moscow and Leningrad from May 11 to 21, 1958, where they visited laboratories, design offices, precasting plants, housing developments and bridge and plant construction. European notables in the field of concrete included Prof. A. M. Haas, Institute of Technology, Delft, Netherlands, Prof. Hubert Rusch, Institute of Technology, Munich, Germany, and Prof. Georg Wastlund, Royal Institute of Technology, Stockholm, Sweden.

The technical program was arranged in so far as possible to present papers on closely related subjects from Europe and the United States. The European visitors are all members of the American Concrete Institute and are distinguished for their accomplishments and writings in the particular areas of the subjects each presented. The program included papers on strength of concrete under combined stresses, analysis of shear test data, comparative cost or blast resistant design, concrete shell roof construction, design problems with precast concrete panels and floor and roof systems, and pressures on formwork.

Reports were also made on high strength steel and cracking of reinforced concrete members, what's coming in ACI Building Code Revisions—footings, creep and deflection, flat slabs and flat plates for industrial buildings — heavy media separation, special finishes and colors in precast concrete wall panels, efficiency of stationary tilting mixers, and lightweight slag concrete.

Following tours of the new building Wednesday morning, October 29, Dr. A. Allan Bates, MWSE vice-president, Portland Cement Association, and ACI Building Committee chairman, presided at the dedication ceremonies for the new headquarters building at a luncheon held at the Statler Hilton Hotel.

New Steel Division

Peterson Steels, Inc., world's leading wholesaler of 52,100 steel tubes and bars, has announced the formation of their Strip Steel Division, with headquarters at Melrose Park, Ill. The new division will promote the sale of razor blade steels, tempered spring steels and other high carbon steels.

In making the announcement, R. G. Willaman, president of Peterson Steels, said the Strip Steel Division will market nationally a line of quality high carbon strip steels now being rolled at the Hellefors Works, Sweden, and at the Eberle Works, in Augsburg, Germany.

Peterson Steels, Inc., has for over a decade been the principal wholesaler of a high grade alloy steel in the form of bearing steel tubing, bars, billets, and forgings. The sale of premium Swedish steels in rods also formed a large part of their overall sales to the automobile industry, ball bearing manufacturers and textile manufacturers throughout the United States.

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C-7044 DESIGNER Grad. EE; Recent Grad. to 3 yrs. exper. in designing components for electronic eqpt. Duties: Design on wave filters, toroidal coils, magnetic amplifiers & pulse transformers. sal. $5400-7800 dep. on exper. loc. Chgo. employer might negotiate the fee.

C-7025 A STRUCTURAL DESIGNER Grad. Engr. 5+ yrs. exper. in industrial bldg. design & steel & concrete. Design of mill bldgs. conveyor supports, etc. sal. abt. $7-800 mo. loc. S.W.Chgo. Suburb, employer will pay the fee.

C-7024 CHIEF PRODUCT ENGR. Grad. Mech. age to 45; exper. in product design. Duties: To supv. engrg. dept. of abt. 18; resp. for product design & devel. of construction eqpt. such as compactors, power trowels, concrete vibrators & finishing screeds & space heaters used by construction industry for drying & heating sal. $12-20,000 dep. on exper. loc. Midwest, employer will pay the fee.

C-7021 CHIEF ELECTRONICS ENGR. Duties: Report to V.P. of Engrg. & Research. Work closely with top mgmt. group in organizing tech. devel. programs, setting up budgets for departmental operation, etc. Resp. for staffing & operat. of dept. of abt. 15 incl. project engrs., engrs. & technicians. Dept's. resp. starts with market problems. Carry thru devel. of eqpt. suitable to customer's needs. Also incl. final des. of eqpt. with all tech. data to be mfg. by product. dept. sold by sales dept. & function efficiently in users plants. Work closely with sales dept. in devel. new areas of application for electronic eqpt. & handling customer's tech. problems. Resp. for handling all in-plant & field electronic service, also electronic devel. shop for bldg. experimental parts or prototypes & some-one-of-a-kind items. Resp. for tech. liaison with outside licensors. Resp. for devel. des. & tech. application of electronic instrumentation to the end that eqpt. will meet market needs. Resp. for all tech. aspects of electronic program from original ideas or customer problems, for mfgrer. of eqpt. for non-destructive testing materials & parts, sal. open loc. Ill., employer will pay the fee.

C-7019 ARCHITECT Grad. age 30+; 5+ yrs. exper. in design spec. writing & field work for an architect on residential, comm. & industrial bldgs. Resp. for all architectural work on residences up to $40,000. industrial & comm. bldg. Personality & ability to work with customers, submit sketches & make recommendations. Must be licensed architect for a builder sal. up to $9,000 loc. Fox River Valley, employer will pay the fee.

C-7017 CHIEF PRODUCT DEVELOP. ENGR. Grad. ME age 35-45; 5 yrs. exper. in product devel. & design, know hydraulics. Duties: Chief Product Devel. Engr. to supv. small engrg. dept. of 7 designers & draftsmen on medium size valves & fittings. Must be good creative thinker with a minimum of 5 patents sal. $12-15,000 loc. S.W.side Chgo. employer will pay the fee.

C-7001 CHIEF ENGR. - PORTABLE COMPRESSORS BSME age 35-55; 10 yrs. exper. must have actual exper. in the devel. & design of portable compressors, know all types of compressors. Duties: Management of portable compressor, design engrg. dept.; considerable field work with sales & service depts., personnel, budget & scheduling resp. Resp. for design supv. of engrs. & draftsmen doing research & devel. work related to gas & air compressors for a mfgr. of hvy. eqpt. sal. $10-15,000 loc. No. Ind., employer will pay the fee.

Engineers Available

909-MW: DESIGN - DEVEL. ENGRG. SUPV. or MANAGEMENT ENGR. 40 BSME; Abilities & interests center upon design- devel. of useful labor & cost-saving machinery. 14 yrs. technical exper. 6 of which in supervisory position. Business education & exper. fit for management. Special exper. in pneumatic-hydraulic (1 patent) $12,000 Chi., Midwest, West Coast.

908-MW: ENGRG. MANAGER 38 BSEE, MS, MBA 14 yrs. professional exper. in planning, coordinating & directing the devel. of products & manufacturing processes. Widely varied assignments in the automotive, aviation & appliance field. Activities have incl. the determination of optimum R & D programs, Midwest.

906-MW: STRUCTURAL DESIGNER MSCE 30; 5 yrs. exper. structural design for buildings. Registered professional engr. loc. open.

904-MW: PLASTICS FIELD ENGR. BNS: BSME 32; Plastic Field Engr. 8 yrs. in plastics industry. Field work relative to sales & Engrg. for customers pertaining to quoting, production methods, cost analysis at all levels. Marketing survey work.

Rust Rates of Cities Established

The comparative rates at which rust proceeds in different parts of the country, have been exactly established for the first time for all United States cities over 10,000 population.

It takes three years, the fastest rate in the country, for rust to corrode a standard, uncoated steel test panel, the size of an auto license plate, in four different cities—Buffalo and Rochester, N. Y.; Erie, Pa.; and Miami, Fla. Slowest rust rate, more than 15 years, is in Tucson, Ariz.; Roswell and Santa Fe, N. M. In all the nation's major industrial centers the rust rate is under four years.

This was disclosed August 25 in the first Rust Index of the United States, published by the Rust-Oleum Corporation, Evanston, Ill. The Index, the result of a 25-year research program, lists the 523 cities of the country with a population of more than 10,000 and the comparative rust rate for each city. Variations in rate result from the different amounts of rainfall, wind, corrosive gases, sunlight, and salt water present in each locality.

The rust rate is three years, one month in Pittsburgh; three years, two months in Los Angeles; three years, three months in Cleveland; three years, five months in Chicago; three years, six months in New York City; three years, eight months in Philadelphia and Detroit; three years, nine months in San Francisco; and three years, 10 months in Boston and St. Louis.

Rust-Oleum Corporation, which produces rust-preventing coatings, estimated that the nation's rust bill is currently about $7½ billion per year, an increase of $2 billion over the annual toll 10 years ago.

The index was compiled in a mammoth research program, in which dated and uncoated steel panels were left exposed at industrial sites throughout the country. The panels were of 28 gauge, low carbon, cold-roll sheet steel. Thousands of panels were dated and left exposed by Rust-Oleum representatives during the past quarter of a century. Periodic examination of the panels provided the data for the Rust Index. The criterion for the Index was the time it took for the uncoated steel panel to rust to a severe degree.

Of the 523 cities listed, 221, or 42 per cent, were indexed as Class I, meaning that uncoated test panels there rusted in less than four years. Class I rust cities include every major industrial area and most of the nation's secondary industrial centers. In Class II, where test panels rusted in four to five years, are 95 cities. The 316 cities in Classes I and II comprise 60 per cent of the nation's cities with population over 10,000.

"Illinois Rainstorms" Is Subject of Report

Severe rainstorms in Illinois is the subject of a report recently published by the Illinois State Water Survey, scientific research division of the state Department of Registration and Edution.

Five record-breaking rainstorms—the kind that produce floods—occurred in Illinois during 1956 and 1957.

The largest amount of rain ever recorded in Illinois occurred in one of the storms on June 14-15, 1957. In southwestern Illinois and eastern Missouri, more than an inch of rain blanketed an area of 22,000 square miles and more than five inches covered 3,000 square miles. At the center of this storm near Millstadt, Ill., 16.54 inches of rain fell within less than 12 hours.

Other heavy rainstorms and their amounts were: June 27-28, 1957 in east central Illinois and west central Indiana with more than 13 inches recorded southwest of Paris, Ill.; July 12-13, 1957, in northeastern Illinois and northwestern Indiana, with more than 11 inches near Kankakee, Ill.; May 21-23, 1957, in southern Illinois and extending into adjoining states, with more than 9 inches recorded near Harrisburg, Ill.; May 26-28 in central Illinois and Indiana, with 13.1 inches recorded near Belleflower, Ill.

These storms are discussed in detail with relation to previous rainstorms studied by the Water Survey since 1948. Mathematical relations useful to design engineers, hydrologists and agriculturists are given.

Entitled "Hydrometeorological Study of Severe Rainstorms in Illinois, 1956-1957, With Summary of Previous Storms," the report is available upon request from the State Water Survey, Box 232, Urbana.

Engineering Clinic Scheduled Nov. 5-7

The 22nd Annual Industrial Engineering and Management Clinic was scheduled at the Hotel Sherman, Chicago, on November 5-6-7, 1958, under the auspices of the Industrial Management Society.

Leading experts from industry, labor and education were to discuss the latest cost reduction techniques covering such subjects as work simplification, time study, incentives, motion economy, automation, plant layout and materials handling.

Highlight of the clinic was to be the showing of prize films from the Society's annual competition for outstanding examples of on-the-job methods improvements in American industry.

More than 1500 production executives, plant superintendents and industrial engineers from the United States and foreign countries were expected to attend the three-day event.

WSE Applications

In accordance with Article I, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the Midwest Engineer *magazine.*

Octave J. DuTemple, Executive Secretary, American Nuclear Society, 86 E. Randolph St.

William L. Doepp, Process Engineer, Automatic Electric Company, Northlake, Ill.

C. Miles Burpee, Executive Director, American Wood Preservers Institute, 111 W. Washington St.

Cecil M. Stanley, Estimating Engr. & Eng. Detail'g., Link-Belt Company, 2410 W. 18th St.

Les Siegel, Chief Engineer, Marvel Manufacturing Co., home: 5654 Ridge Ave.

T. B. Smith, Chief Engineer, Jewel Tea Company, Jewel Park, Barrington, Ill.

Robert V. Erikson, 14209 S. LaSalle St., attending Illinois Institute of Technology.

Lawrence M. Rosner, Building Inspector, City of Chicago, 320 N. Clark St.

Contest Offered for Chicago Architects

Chicago area architects and builders were invited by the Chicago Brick Producers to help in the production of a brochure illustrating unusually interesting and outstanding uses of Chicago Building Brick. Publication of the book is part of the 125th Anniversary of brick-making in Chicago.

Photographs, photostats or architectural renderings of old and new structures were to be considered. The buildings may range from homes to hospitals, schools, churches and all kinds of commercial and industrial structures. This picture contest was open to all local architects.

First prize was a $100 U. S. Savings Bond and an additional 25 Citations of Merit were to be awarded.

"Since the first Chicago Building Brick were manufactured back in 1833, these brick by the billions, have played a vital part in building Chicago," according to Ron Ryner, executive director of Region 5-SCPI, who coordinated the activity. "Chicago Building Brick are a significant factor in today's skyline and they'll be even more predominant in exterior and exposed interior walls as the city and suburbs build future beauty and utility."

Participating producers included the Brisch Brick Company, Carey Brick Company, Chicago Brick Company, Illinois Brick Company, National Brick Company and the Tuthill Building Material Company.

Paper Sandbag Under Development for Army

A paper sandbag that, in time of emergency could replace the standard jute sandbag with respect to quality and supply is under development at the U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va.

As part of this development program, 26,000 paper sandbags are now being tested at various locations.

The knitted paper sandbag under development has all of the physical qualities of its jute counterpart, both wet and dry, and also stacks and handles satisfactorily. The sandbag mesh does not lose any significant quantity of fill material, except when a very dry fine sand is used. The mesh, however, can be made as fine as desired. Excellent wet strength is obtained by treatment with a urea-formaldehyde resin (Uformite). Fungicidal protection is presently achieved by use of a form of solubilized Copper 8 Quinolinolate.

On the basis of restricted field tests, the knitted paper sandbag can be classified as a 60-day bag under the most severe weathering conditions, and can withstand normal weathering effects in excess of 6 months. The knitted fabric does not ravel when punctured; resists the shock effects of a close blast, at least as well as jute burlap, and has a service life in water comparable to that of the standard military jute sandbag.

The present stage of paper sandbag development has been reached through the cooperation of the Cellucord Corp., Gilman, Vt. and Commonwealth Coloring and Chemical Co., N. Y. C., who supplied the experimental knitted paper bags and copper 8 quinolinolate fungicide formulation, respectively.

It is expected that with further development work, the service life of these paper sandbags will be significantly increased.

Test Aluminum Truss Panels at Ft. Belvoir

The U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., are currently conducting structural tests on four full-size experimental all-welded aluminum truss panels for a military tactical bridge.

Believed to be the first of their kind in the United States, these truss panels have been fabricated by Aluminum Company of America from one of the new non-heat-treatable, weldable aluminum alloys. Design of these experimental truss panels has been based upon the general data currently available.

It is anticipated that the truss components will support a 60-ton tank load on approximately a 90-foot span. In order to obtain this capacity in the past, when high strength, heat-treatable aluminum alloys were used, it was necessary to build-up basic panel members by neutral axis welding. The panel components were then joined by riveting or bolting.

Since military bridge equipment is required to be portable and rapidly constructed, the bridge trusses are divided into light-weight, simply connected panels. The basic features of the experimental panels are: length—16 feet 2 inches; height—7 feet 7 inches; and fabricated weight—920 pounds. All of the members of the truss panels were fabricated from aluminum alloy 5456-H321 plate stock which has an ultimate tensile strength of 42,000 psi. The upper and lower chords are box sections, and the diagonal and vertical members are built-up wide flange sections. All of the welding was accomplished by the inert gas-shielded metal arc method using consumable electrode.

The results of the structural tests are expected to give some indication of the feasibility of welded aluminum truss panels for heavy military vehicular loads and to furnish test data that can be utilized in the development of more specific design criteria for similar truss type structures.

Jaywalking was costly in the U.S. last year—2,600 were killed.

Case Looks for Air "Scrubbers"

In an era of new-blue washday soaps, suds-free detergents and a host of other substances designed to lighten the housewife's laundry burden, Case Institute of Technology scientists are beginning to take a closer look at some "super scrubbers" for another very important item . . . the air we breathe.

The U. S. Public Health Service has awarded a $24,955 research contract to Dr. Seymour Calvert, associate professor of Chemical Engineering, to study the effects of "wet scrubbers" for air pollution control. His basic research will attempt to pin down more definitely the effectiveness of certain contacting systems used to remove contamination from gases and vapors produced in industrial areas.

Air pollution control has become a subject of prime importance in the planned developmtnt or re-development of urban areas. More and more noxious fumes are being released into the atmosphere, creating a very serious problem for industrial areas.

The eye-stinging, lung-choking smogs in Los Angeles, for example, are the result of the inadequacy of present air pollution control techniques in the face of an extremely difficult meteorological situation. While other major industrial centers in the U. S. do not have the same contributing weather situation, nevertheless they are looking forward unhappily to the same sort of contamination unless scientists and engineers can develop more effective methods to remove undesirable elements from industrial gases.

Dr. Calvert points out that engineers do not yet have a method for fully evaluating the effectiveness of present wet scrubbing systems. Due to this lack of knowledge, some systems must be "overbuilt" by as much as 100 per cent in order to guarantee satisfactory results, making unduly expensive their installation and operation.

Dr. Calvert and his staff will work on the development of some new theories in an effect to so pinpoint the effectiveness of certain "scrubbers" that air pollution systems may be designed, built and operated more economically and with better results. They will do this by studying separately one of the several modes by which the liquid makes contact with the contaminated gas, and study it to see how the contact can be made more effective.

For example, one wet scrubbing system passes the gases through a screen on which thousands of water drops hang. The contact of the gas with the water removes contaminants.

Dr. Calvert has theorized that a vibrating or wiggling drop of water may present more surface with which to clean the gases. This will be one of several systems he hopes to study.

The Public Health Service has recommended that the project be continued for an additional two years provided funds are available. Most of the information gained will be published first in theses for advanced degrees by the graduate students working with Dr. Calvert.

Hilberry Presents Blueprint for Peace

A blueprint for the construction of world peace—with science providing the foundation for mutual understanding and respect among peoples—was presented to a Chicago Sunday Evening Club audience the night of October 17 by Dr. Norman Hilberry, director of the Argonne National Laboratory, one of America's key centers for the development of peacetime uses of nuclear energy.

Speaking at Orchestra Hall on the topic: "Science, the Pathway to Peace", Dr. Hilberry reviewed the role of science in World War II, recalling the production of such military material as the V-2 rockets, radar, and proximity fuses, and the climactic development — the atomic bomb.

"If we have another war, it will inevitably be a nuclear war, and the results will be incalculable," Argonne's director said. "The only sane conclusion is that war must be abolished," he added.

Fundamentally, peace can be obtained only through the development of mutual understanding and respect, Dr. Hilberry declared. He pointed out that ever since the tower of Babel, people have been divided with reference to language, traditions, and philosophy, and to each individual his language, traditions and philosophy are inviolate.

"We must seek a new foundation if we are to obtain mutual respect and understanding—if we are to cut across the boundaries set up by these differences," the speaker said.

"Fortunately, science does provide one such area," Dr. Hilberry continued, "for all men have truly equal opportunity before science and the laws of nature. The language, the traditions and the philosophies of science are universal."

Argonne's director explained that all the complex history of peoples vanishes in this concrete groundwork. "Each individual," Dr. Hilberry pointed out, "knows that within the framework of his own intellect he has equal opportunity with respect to every other man."

The individual's knowledge of this precept at least provides an entering wedge for the development of cooperation and mutual respect, the speaker added.

"As the work of science expands we can expect a wider area of understanding in human endeavor," Dr. Hilberry said in concluding his address.

IIT Research Addition Dedicated

A $1,200,000 addition to the Metals Research Building at Armour Research Foundation of Illinois Institute of Technology was dedicated in Chicago on October 20.

The event marked the completion of the second step in a 10-year expansion program announced by the Foundation early in 1956. The construction is the 24th new building in the over-all expansion and development program on the campus of Illinois Tech.

The four-story addition will more than double the department's space for metals projects, with a total of 68,000 square feet, according to Dr. Donald J. McPherson, manager of metals research.

It was designed by Ludwig Mies van der Rohe, retired director of the IIT department of architecture. General contractor was George Sollitt Construction Co.

The dedication program included a luncheon in the IIT Commons Building for members of the board of trustees and administrators of Illinois Tech and Armour Research Foundation, and representatives of industrial and research organizations concerned with metals research.

Main speaker at the luncheon was Dr. John H. Hollomon, manager of the metallurgy and ceramics research department of General Electric Research Laboratory, speaking on "Materials Research."

McPherson also spoke on "The Growth of Metals Research at ARF."

Dr. John T. Rettaliata, MWSE, president of IIT and Armour Research Foundation, presided and spoke at the formal dedication of the building after the luncheon.

Research in the ARF metals department covers the entire scope of metallurgy — from steel-making to nuclear reactor materials — and is conducted in eight sections: applied metallurgy, electrochemistry and extractive metallurgy, foundry and steelmaking, metallurgical processes, physical metallurgy, powder metallurgy, reactor metallurgy, and and welding.

Space in the addition is allotted to bench-work type laboratories and offices while the original building will be used for heavy equipment.

The ARF expansion plans call for the construction of two more buildings and another extension to an existing building. Already completed is a $1,250,000 Physics and Electrical Engineering Building.

Engineering Talent Loss Called Serious

The loss of engineering talent at the senior level in college has reached serious proportions, President John T. Rettaliata, MWSE, declared on October 21 at the annual meeting of the board of trustees of Illinois Institute of Technology.

He expressed alarm over the fact that in 1957 on a national basis less than 85 per cent of senior engineering students received degrees.

In his report to the board at the Chicago Club, he said the number of seniors receiving degrees has been heading downward since 1951.

"This is a loss the nation can ill afford, particularly in engineering and science," Rettaliata said, "for our very survival in future years will depend upon our scientific and technological competence."

The educator attributed the loss of senior students to lack of funds, changes in curriculum, inadequacy of grades and the attraction of favorable job opportunities in industry. To remedy the situation, he called for "a strengthening of high school programs to challenge the minds of students and create in them the ability to think and the desire to learn."

However, he emphasized that "America should not imitate the Russian education system which tends to create an intellectual elite.

"Our goal at all levels must be to educate properly in both quality and quantity.

"There are many indications pointing to a long-term, strong demand for engineers. It is also a hopeful sign that more of the nation's youth are indicating an interest in engineering."

In discussing the sputnik scare, Rettaliata said, "Science has not failed America. We have proved that we have the know-how, but it will not be enough to be second best in an age of intercontinental missiles and nuclear weapons."

Citing the importance of encouraging scientific and technological talents, he warned that "we must not neglect other fields of learning which contribute to the development of the broadly-educated people needed to deal with the complex world of today.

"We must strive to produce graduates who have broad concepts and understanding of their social, as well as professional responsibilities."

Will Russians Make It Hot in the Arctic?

The Russians have come up with a plan that they claim will make the polar region 60 degrees warmer, reports *Engineering News-Record*. By building a 43½-mile dam from the Chukchi Peninsula to the coast of Alaska, they say Pacific cold currents will be stopped from flowing into the Arctic Sea, causing the water level of the sea to drop. Then, more of the Gulf Stream will flow into the polar region and it will warm Siberia and Alaska.

Building Quake Behavior Studied

Why some structures behave in such an anomalous manner during earthquakes . . . why weak buildings remain standing and strong buildings collapse . . . can easily be explained, a California professor told the American Society of Civil Engineers at a convention meeting in New York on Oct. 14.

Studies during earthquakes by so-called response spectrum curves give the answers to much of the puzzling behavior of structures in earthquake areas, according to G. W. Housner, professor of Engineering at the California Institute of Technology.

For example, according to Prof. Housner, after almost every strong earthquake it is observed that a few old and apparently weak buildings survived even though their known strength was relatively low.

This, he said, can be explained as the result of two factors. First, the true ultimate strength of a structure is often much larger than the nominal design strength. Second, such old, loose-jointed structures may absorb large amounts of energy during only moderate vibrations and, as seen from the spectrum curves, such a structure could survive strong motion without actually being subjected to high stresses.

It is also not uncommon to observe that the same ground motion that apparently did no damage to an old, weak building damaged a relatively strong building. This is explained by the fact that in such strong structures the vibrations resulting from strong ground motion becomes worse, and then some member of the structure shows distress.

After the Mexico City earthquake in 1957, the epicenter or focus of which was 220 miles away, it was observed that in the same district old masonry buildings came through the earthquake on the whole better than modern steel and concrete buildings that had greater lateral strength.

Prof. Housner stated that this can be explained as resulting from the long distance of the epicenter from the city. The old masonry buildings were mostly low structures with short periods of vibration, whereas the modern structures were largely multistoried, long-vibration period buildings, so that in effect the old buildings experienced a much weaker ground motion than did the modern buildings.

He also noted that after almost every destructive earthquake, some buildings are observed to be in such a badly-damaged condition that, from the design point of view, it seems a miracle that they did not collapse.

If the damage to a structure is looked at as a process for absorbing energy, he said, the survival of these structures is not so mysterious. In these cases it is not so much a matter of strength as it is a question of whether the structure can continue to absorb appreciable energy during its vibrations. In badly damaged buildings which show interior and exterior cracked walls, it is evident that a large amount of energy has been dissipated, and that further vibrations will continue to dissipate energy.

Prof. Housner gave his opinion that it does not seem economically justifiable that in a seismically active region all buildings should be designed to survive the strongest possible ground motion without any damage.

"It is more reasonable to take the point of view that the design should be such that the structures will survive the more frequent, moderate ground motions without damage, but in the more rare event of very strong ground motion damage would be tolerated so long as it was not a hazard of life and limb."

Corrosion Show

A number of companies already have contracted for 55 exhibition booths at the 1959 Corrosion Show, National Association of Corrosion Engineers. More than twice this number will exhibit, it is estimated. The 15th Annual NACE Conference and 1959 Corrosion Show will be held in Chicago, March 16-20, 1959.

In the Conference, increased interest in the Pulp and Paper Industry Symposium has caused expansion of the symposium to two sessions. Additional technical papers on the subject made it necessary to change the date for the symposium to March 16.

Corrosion preventive work being done in the industry and reported by the Technical Association of the Pulp and Paper Industry will be summarized in a paper opening the symposium. A special invitation to attend the symposium will be issued to members of TAPPI.

Passenger cars were involved in over 78 percent of all U.S. traffic fatalities in 1957.

A total of 38,700 Americans were killed in 1957 traffic accidents.

In 1957, 2,525,000 Americans were injured in traffic accidents.

MIDWEST ENGINEER
Advertisers' Index

Obituaries

WSE Member Dwight E. Perrine passed away on September 21, 1958 at the age of 57. Mr. Perrine was associated with the Chicago & Western Indiana Railroad and the Belt Railway Company of Chicago as Assistant Chief Engineer.

He had taken an active part in the affairs of the Society, particularly those of the Transportation Engineering Section. For the past two years he had been on the Executive Committee of that section. His passing will be deeply felt by his many friends both in and out of the Society.

* * *

George A. Saint, 80, passed away on September 2, 1958. Mr. Saint, a Life Member of Western Society, was for many years associated with the Chicago & Northwestern Railway Company and, until his retirement, was active in the interest of the Society.

Mr. Saint joined Western Society in 1919 and attained Life Member status in 1949. Western Society, in the name of its members, expresses to Mr. Saint's family its deepest sympathy.

Light Beams Help To Inspect Blading

A new instrument that uses two beams of light to solve the difficult problem of inspection of turbine engine blading was unveiled October 13 at Eastman Kodak Company's Apparatus and Optical Division in Rochester, N. Y.

Known as the Kodak Section-Profile Projector, the instrument is based on a new engineering approach. The new design permits viewing of an entire section of a compressor blade, vane, turbine bucket, or half of a forging die. With some training, an operator can rapidly measure dimensions of such parts to within five ten-thousandths of an inch as well as twist to five minutes of arc.

The projector will be used primarily for inspection of the blades in jet engines, but is expected to have uses in other engineering fields, Allen R. Fultz, designer of the projector, reported.

Fultz said the optical system of the airfoil sectional projector has three major advantages for this type of inspection work: 1. it provides illumination for a well defined image; 2. long turbine blades can be inspected; and 3. the instrument can project entire sections of shrouded blades or blades with high twist.

Two high-pressure mercury-vapor lamps provide intense illumination on both sides of the blade. A special contour mask and relay lens system combine to eliminate distortion in the illuminating optical system, Fultz explained.

The bright line of light thus focused on the blade is viewed by two lens systems each at 35-degree angles to the blade, Fultz pointed out. Viewing at these angles prevents interference of the light beam by blade shrouding or twist and permits the inspection of long blades. A mirror system and a Fresnel bi-prism redirect the images of each side of the blade so that they correctly enter a projection lens, he said.

The blade section contour appears on the screen of the projector as a dark image sharply outlined by a bright band of light. Both leading and trailing edges are shown with equal clarity for inspection, Fultz said.

The projector will inspect work up to 16 inches in length, with 2¼ inches chord and 45 or more degrees of twist, Fultz reported.

Standard airfoil charts or specifications can be used as overlays on the projector screen to determine directly whether the turbine blade is within tolerance, the engineer said.

Eastman Kodak's unveiling of the Kodak Section-Profile Projector is for manufacturers and users of jet engine blades, a company spokesman said. The projector is not in production, and the showing was arranged so the turbine engine industry could evaluate the new equipment. Plans to manufacture will be developed after study following the comments and suggestions of the industry, he said.

Poor Producers

More than one-third of the Russian people are farmers, as compared with less than one-tenth of the people in the United States, says *Food Engineering*. Yet, Russia produces only 71 pounds of meat per person, compared to 226 pounds in the U. S.

African Gas Plant Described at AICE

A South African plant that produces gasoline, diesel oil, and other petroleum products from subbituminous coal was described in Salt Lake City on Sept. 22 at the 38th Annual Meeting of the American Institute of Chemical Engineers.

The plant, operated by the South African Coal, Oil & Gas Corporation, uses the Synthol process and has a daily output of 3,260 barrels of gasoline per day, plus 142 barrels of diesel oil, Luther W. Garrett, Jr., of the M. W. Kellogg Company, New York, reported in a symposium on petroleum substitutes. The refinery also has a daily output of 46 barrels of waxy oil, 14.5 barrels of methanol, 12 barrels of crude ethanol, 302 barrels of pure, anhydrous ethanol, 21.8 barrels of methyl ethyl ketone and 15.8 barrels of pure acetone, he said.

He described the over-all gasification process thus: "Coal is delivered from the nearby mine by means of conveyor belts to the coal gasification and power plant units. The coal is gasified under pressure in Lurgi reactors using superheated steam and essentially pure oxygen. The gas liquor stream from the gasification plant yields phenol and ammonium sulphate as by-products. Tar and light oil are recovered from the hydrocarbon condesate from the coal gasification unit. The raw gas is then processed for the removal of CO_2, H_2S and organic sulphur and is fed to the two synthesis plants. The Arge (German) synthesis is utilized to produce primarily diesel oil and wax fractions, whereas the Kellogg synthesis produces primarily motor gasolines. A catalytic gas reformer is employed to prepare feed for the Kellogg synthesis since the methane content of the purified coal gas is too high to be economically processed. Also, certain tail gases must be reformed for recycling to the Kellogg synthesis unit. The hydrocarbon liquid and vapor streams from the synthesis are sent to a gas recovery and cat poly plant, while the aqueous stream containing oxygenated chemicals is processed to produce a variety of products —no particular attempt is made to recover chemicals from the Kellogg synthesis plant."

How many of these electric helpers have you added since 1947?... asks LITTLE BILL

☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i

You're an average family if—in the postwar years you've added six new electrical appliances. Shown here are a few typical examples.

This is why you're using far more electricity nowadays than you did just a few years ago. And why life is a lot easier. But of all the things you buy today, electricity has gone up *less* than almost anything else.

So, while your bill may be a *little* higher, electricity is actually doing nearly twice as much work for the money now as it did years ago.

See how little it costs to run each of these electric helpers.

a—Automatic washer—2 loads for 1¢. Saves hours of work each week.

b—Electric dryer—6¢ a load is all you pay to dry the clean electric way.

c—Hi-Fi—about 2 hours for 1¢—4 long-playing records for a penny's worth of electricity.

d—TV set—2 hours for 1⅕¢—The world's finest entertainment for pennies a day.

e—Sewing machine—runs 4 hours for 1¢. Easy way to stretch your clothes budget.

f—Refrigerator—3¢ a day. New under-counter model is handy for soft drinks, ice, or snacks.

Other appliances include:

(g) Steam iron—Glides along easily on its own cushion of steam for less than 2¢ an hour, **(h) 150-watt lamp**—Good reading light costs but a penny for over 2 hours, **(i) Electric clock**—the exact time, just 1¢ a week.

"Electricity costs less today, you know than it did 25 years ago!"

Commonwealth Edison
AND
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